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No. 2

## MARKED ADVANCES IN SHIP VALUES.

Six or eight months ago the wooden steamer of 2,500 to 2,800 tons capacity, of which there is quite a large number on the great lakes, and most of them not very old, was not looked upon as very valuable property. Now these vessels are held in some cases at prices 50 per cent. above what they could be bought for last winter. Several wooden steamers of moderate size that were on the market just before the opening of navigation, were offered at \$55,000 to \$65,000; now \$80,000 and \$85,000 are the prices asked for them. Negotiations are pending for the transfer of several vessels that would be considered almost worthless a short time ago, but the parties are slow in coming to terms on account of the general advance in values.

One of the two large freight steamers building at the Wyandotte works of the Detroit Ship Building Co. has been purchased by the Presque Isle Transportation Co. of Cleveland, and will therefore be managed when she comes out in the office of Mr. W. G. Mather, the same as the vessels of the Cleveland-Cliffs Iron Co. Probably a few trips will be gotten out of this steamer in the fall, but the second vessel building at Wyandotte will not be completed for the present season. The vessel taken over by the Presque Isle Co. is the one contracted for by Eddy Bros. of Bay City in January last at a cost of \$240,000. Rumor has it that the Presque Isle Co. paid a premium of \$30,000, but the actual price at which they are to acquire the ship is not, of course, given out. The Presque Isle Co. has important ore connections, mainly the famous Lake Angeline mine.

Of all the consuming interests in iron and steel lines that have bought vessels of late, the Tonawanda Iron & Steel Co. is probably most fortunate. It seemed like a hardship, some time ago, that they should be forced to buy vessels in order to move their ore through shallow water down the river below Buffalo, but they are undoubtedly congratulating themselves now. They took the right course in getting under cover early when prices of wooden vessels were not high, but they did so in a thoroughly business-like way and therefore secured the vessels they wanted at low prices. They would be paying some fancy ore freights this season, if they were dependent upon the general market, and probably could not move their ore at any price. It is understood that Capt. E. Rathburn, who was in the Santa Maria, John F. Eddy and other vessels, has taken a position ashore with the Tonawanda company.

Just before she went ashore at Ashtabula a few days ago, the schooner Warmington was sold to L. P. & J. A. Smith, public works contractors of Cleveland. But the sale was subject to delivery of the vessel in Cleveland, so that the Smith company loses nothing on account of the accident. Now that the Warmington has been released, however, the transfer will probably be carried out immediately after necessary repairs are made. The Smith company will use the Warmington in carrying stone from Kelley's island to the breakwater extension on which they are engaged at Cleveland.

## THE CONSOLIDATION OF TOWING INTERESTS.

Probably a month will elapse before the consolidation of towing and wrecking interests on the great lakes is fully effected, but it is not at all probable now that there will be any hitch in the plans, as enough has been done to insure the success of the new company. Even after the money required for this undertaking had been subscribed by some fifty of the leading vessel owners of the great lakes, including the managers of all the principal ore companies and several representatives of the line-boat interests in Buffalo, and it was found that the stock could be sold four or five times over, it was still agreed that unless the property of the various harbor tug lines could be brought into the combination at such prices as to insure sound business methods, the scheme was not to be carried out. The plan of organization, which involves a certain amount of stock to be taken by the several companies entering into the organization, is so conservative as to appeal to the tug owners as well as to the vessel owners.

A number of guesses have been made regarding officers of the new company. It has been said, for instance, that T. F. Newman of the Cleveland & Buffalo Transit Co., Cleveland, would be secretary and treasurer, and W. A. Collier of the Vessel Owners' Towing Co. of Cleveland, general manager. Both of these gentlemen have been promoters of the consolidation from the beginning and will very probably be given places in the new company if they see fit to accept office, but Mr. Geo. A. Garretson of Cleveland, who has been very active in everything pertaining to the important item of finances for the consolidation, says he has not heard from the beginning a single name mentioned at any of the meetings for an office of any kind.

## AUTHORITY OF NAVY BUREAUS.

A report has been submitted by the board appointed by the secretary of the navy to devise means to obviate clashes in authority between the different bureaus of the navy department having to do with the construction and repair of ships. The recommendation submitted is that no changes be made in the regulations for the government of the several bureaus, but that hereafter when the bureau chiefs cannot harmonize their differences, the questions at issue shall be presented to the naval board of inspection, which will be practically a court of appeal.

Almost on the heels of this report, there has sprung up a discussion among the chiefs of the various bureaus regarding naval regulations No. 433, passed Oct. 9, 1894. This order, which was promulgated by Secretary Herbert, materially increased the authority of the chief constructor and provided explicitly that no changes or alterations in ships built or building should be considered or ordered unless the constructor had first passed upon the recommendation. The need for the order at the time was

urgent, top-heaviness and other serious faults having been developed in originally efficient vessels, as a result of orders issued by various bureau chiefs on their own authority. The imperative necessity for such a safeguard is, of course, quite as apparent now as at the time the order was put in force, but the naval board of construction has been for some time past indulging in considerable fault-finding on the subject, and a few days ago a majority of its members filed a report recommending that the order be rescinded entirely or at least modified so that a large proportion of the responsibility for the designs of ships and the distribution of weights be taken from the bureau of construction. The board suggests that the matter be again given into its hands. Rear Admiral Hichborn, the chief constructor, does not intend, however, to pass over what he regards as a serious blunder without a vigorous protest, and he has accordingly filed a lengthy minority report. He asserts that any errors that have been made have been due not to the enforcement of the regulation but to its violation and evasion. He cites several instances illustrative of the difficulties encountered when the order is ignored, and also makes a comparison between the general conditions existent today and five years ago.

Meanwhile the conditions growing out of a continuance of the disputes between bureau chiefs on various subjects may very naturally be expected to still further influence Secretary Long in his desire to consolidate the bureaus of construction, steam engineering and equipment. He will, however, do nothing until reports are received from the heads of these bureaus. There has been a suspicion that the secretary's suggestion would meet with general opposition, but Rear Admiral Hichborn of the bureau of construction and repair, will shortly submit a report in which he will favor the proposition. He will show that the method at present followed by the United States navy department is far more intricate than that obtaining in the private ship yards of the country or the government yards of Europe. Finally it will assert that economy of time, work and money may be effected by a consolidation of the three bureaus.

## PRAISE FOR THE TRIGG CO.

Rear Admiral George W. Melville, engineer in chief of the United States navy, and Irving M. Scott of San Francisco, general manager of the Union Iron Works, have just concluded a brief visit with Mr. William R. Trigg, president of the Trigg company at Richmond, Va. Messrs. Trigg and Scott are old friends; indeed it was the latter who ten years ago suggested to Mr. Trigg the feasibility of building ships on the James river. The visit of Rear Admiral Melville was semi-official in character, and certain comments made by him relative to the plant of the Trigg company and the state of the government work in progress there are consequently of interest. Rear Admiral Melville said in part:

"I must say I was more than pleased at the progress that has been made. I was surprised at the territory covered by the plant, which is especially fitted for the work in hand. The machine shops are much larger and more extensive than I had any idea of. I was pleased to see well onto 400 mechanics at work, with every tool in motion, showing that the yard is being worked to its fullest capacity. The works are light and airy and the mold loft is modern in all respects. In fact, it looked as if it were almost an impossibility that so extensive an establishment could have grown up in so short a time. In regard to the progress of the work, it is very well advanced; in fact further advanced than the work at any of the yards that received contracts at the same time. Proof of this is found in the fact that other builders have received only three payments (the payments are made on progress of the work), while the Trigg company is now entitled to the fifth payment. In looking over the layout of the land and water, and the possibilities of the future, Richmond seems ready to take hold of any kind of work as high as 3,000-ton ships. The yards are limited only by the draught of water in the James river. When the channel is dredged to 25 or 28 feet, there is no reason why the Trigg company should not engage in building the heaviest ships used by the government. In fact it is an ideal location. It is all a mistake for people to attempt to build a ship yard away from the center of a great city. It is absolutely necessary to have a large force of mechanics to draw from and the nearer a ship yard is to the center of a large city the better it is."

## FREIGHTS ON THE GREAT LAKES.

It would seem that there is to be no more let-up in the advance of freights on the Great Lakes than there is in the higher values that are announced almost daily for everything in manufactured lines. Duluth vessel brokers have been advising their customers that they could undoubtedly get 4 cents on wheat from Duluth to Buffalo if desirable vessels were offered and if shippers were given the option of moving the grain either in September or October. This is an indication of what is expected in fall freights. Ore shippers have been trying to get vessels at 90 cents from the head of Lake Superior, but they have succeeded in making few charters, and would undoubtedly pay \$1 very readily if enough vessels were offered them to warrant the advanced rate. Coal is moving to the head of the lakes at 40 cents more freely than at any time since the opening of navigation, but shipments are, of course, away short of the requirements. Not more than quarter of the number of vessels required to move coal to Lake Michigan ports are secured from day to day, but shippers still say there would be nothing gained by paying more than 50 cents to Milwaukee or Chicago. The small vessels trading to out-of-the-way ports are deriving quite a profit from the coal trade these days. They are deserving of it, as they have had thin picking for several years. Some of the rates paid these vessels from Ohio ports are: To Port Huron and other river ports, 35 cents; to Collingwood and Algoma Mills, 60 cents; to Owen Sound, 55 cents; and from Buffalo to Toledo (hard coal), 45 cents in a few cases, with return cargoes of grain at 1 1/4 cents.

## MODEL AMERICAN SHIPYARD.

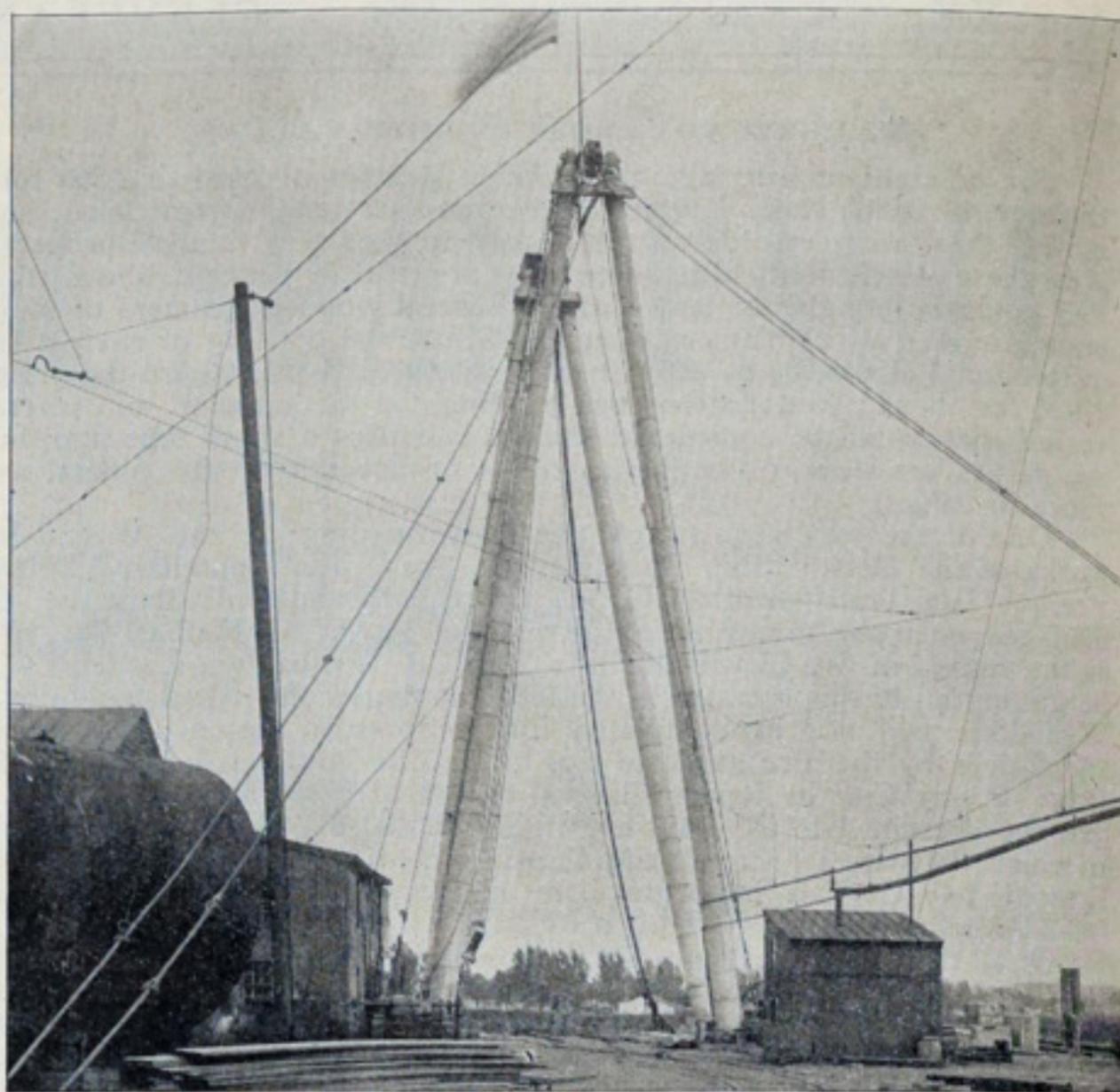
THE PERFECTLY APPOINTED PLANT OF THE HARLAN & HOLLINGSWORTH CO. AT WILMINGTON, DEL.—ADMIRABLE EQUIPMENT OF MACHINERY AND THOROUGH METHOD OF OPERATION—NOVEL PLANS FOLLOWED—VESSELS UNDER CONSTRUCTION.

Long established integrity of work combined with modern aggressiveness and enterprise are qualifications of great value in a ship building establishment as in any other organization. The possession of the former of these principles by the Harlan & Hollingsworth Co. of Wilmington, Del., has long been recognized as a self-evident truth in shipping circles throughout the United States and indeed in other parts of the world. The extent to which the latter characteristic has of late been developed in these same works is best shown by the unprecedented success of the Wilmington yard in securing contracts for new vessels during the past year.

The growth of the plant itself has kept pace with the steady increase in the business of the company and improvements have therefore at times been on a big scale. This may be better appreciated when it is stated that in 1836, the date of establishment of this ship yard, the entire property occupied was a lot 45 by 65 feet, with one three-story building and a small shed adjoining it. Five years later a new location was taken up, but that plat selected was scarcely more extensive. Now the land occupied by the company on both banks of the Christiana river aggregates 76 acres and it contains forty-seven iron, brick and wooden buildings.

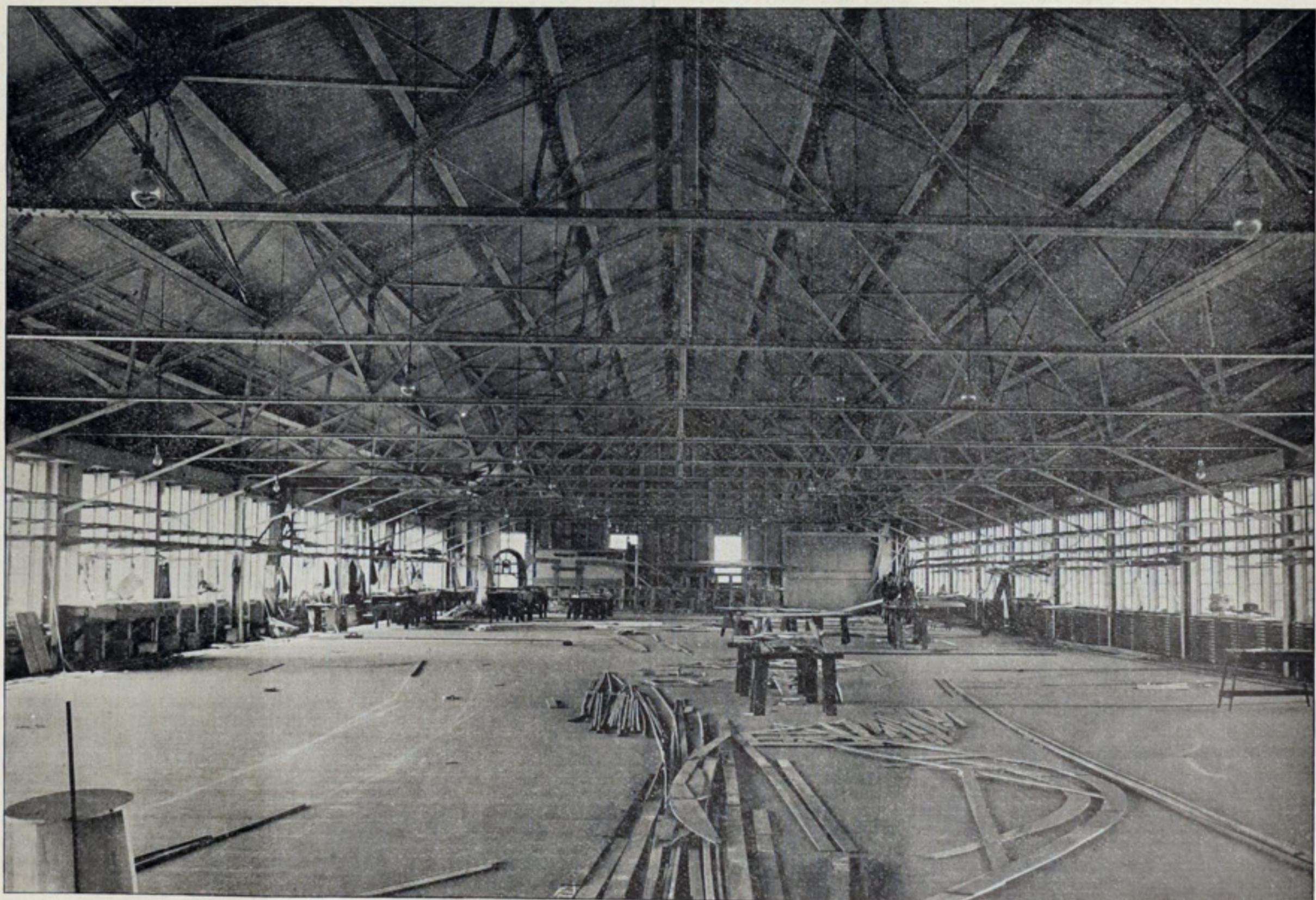
Owing to the manner in which the present plant was acquired, there is no general power house. Motive power for each department is supplied from its own engine room. There are no less than fifteen engines with a collective horse power exceeding 1,500, the engines ranging in capacity from a 250-horse-power Putnam in the machine shop to a 2 horse power upright machine designed to drive a band saw for cutting out models and battens in the mould loft. The works proper of the Harlan & Hollingsworth Co. are situated upon the northern bank or concave shore of the Christiana river, although the company owns the land upon both banks for several blocks. The entire length of the company's property on the northern bank is wharfed out, affording a water frontage of over 3,000 feet, and berths are provided for about a dozen vessels. A sectional basin dry dock of the Simpson type at these works was built in 1870. The dock is 328½ feet on the bottom, 353 feet on top, 42 feet width at the bottom and 90 feet width on top, and is capable of docking vessels up to 340 feet in length. The dock is descended by twenty-four steps on three sides and at the end opening on the river a caisson gate is operated.

this department is now fitted with all the latest improvements in metal working machinery, including horizontal planes, lathes, boring mills, slotters, shapers, milling tools of all descriptions, radial drills, and one of the largest boring, milling and drilling machines ever built in this country.



MASTING SHEERS—150 TONS DEAD WEIGHT CAPACITY.

In the blacksmith shop are five steam hammers, ranging from 500 to 2,000 pounds drop, a die press machine and a punch capable of punching a 6-inch hole through inch plate. This latter is operated by a special up-



MOLD LOFT AT SHIP YARD OF THE HARLAN & HOLLINGSWORTH CO., WILMINGTON, DEL.

The dock is filled by gravity and emptied by means of a pump, the pumping capacity being in the neighborhood of 1,500 gallons per minute. The boiler from which the pumps are supplied also generates steam for working the hoister and stevedoring machine located on the dock at the lumber slip.

The equipment of the machine shop is all that could be desired for the best modern practice. Heavy additions have recently been made and

right fly-wheel engine and is connected by cog gearing. The joiner shop is of the regulation type, although notable for the completeness of its equipment, which includes, of course, stickers, molders, shapers, four-side planers, smoothers and circular, jig, and band saws.

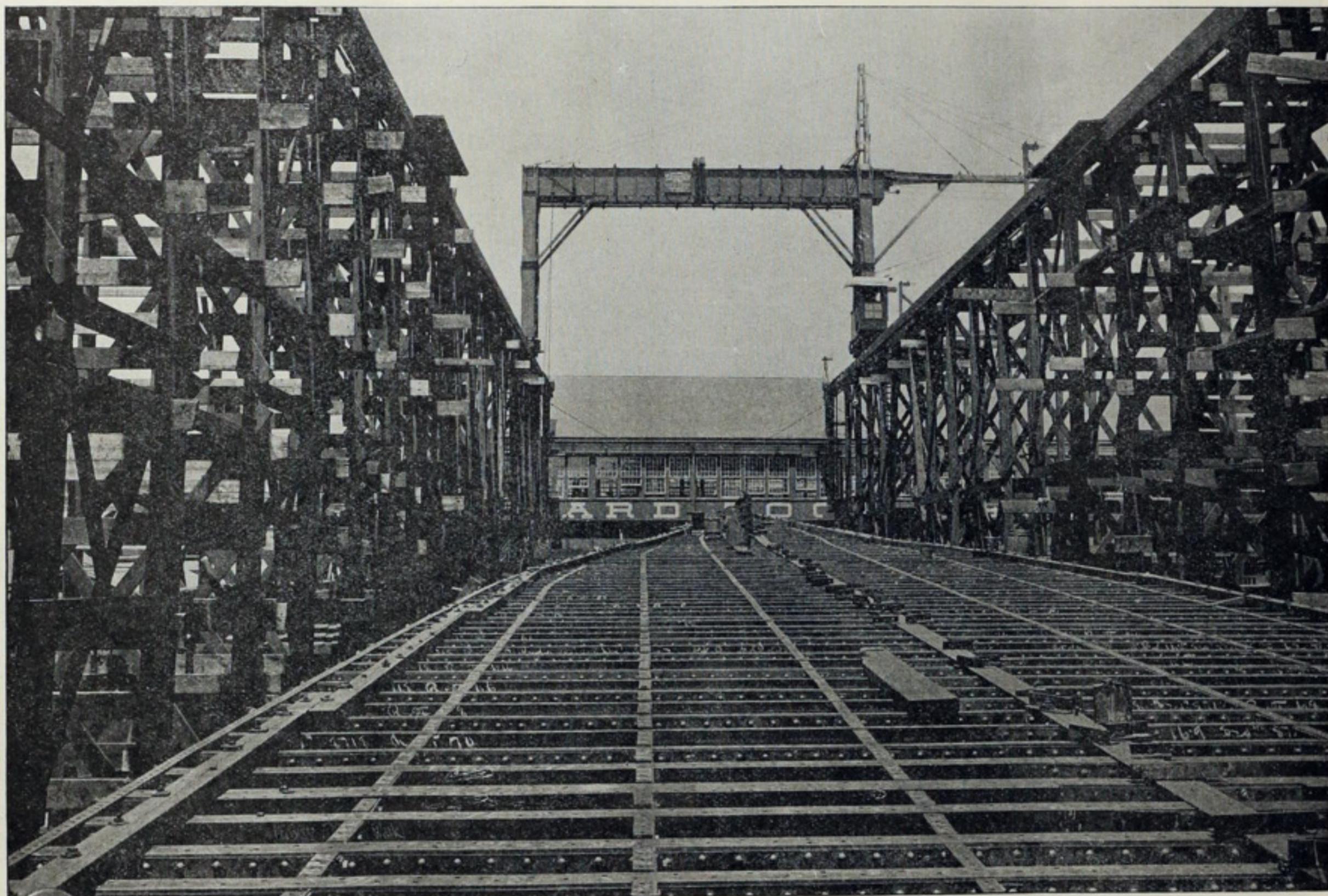
Tools in the boiler shop will prove of no small interest to the practical ship builder. There is an excellent set of power rolls, punches, shears, an immense hydraulic riveting plant, having a duplex hydraulic

supply pump with 12 by 10-inch steam cylinder, a 7-inch diameter by 14-foot stroke hydraulic ram with ample accumulator, and a Tweddell patent fixed cast steel "Atlas" or flush-top riveter, with automatic plate closing attachment, having a gap of 10½ feet in the clear and operated under a pressure of 1,500 pounds per square inch. This last mentioned machine exerts 100 tons pressure upon the rivet and plate. In addition to all these there are four traveling cranes of large capacity and numerous incidentals. In the foundries there are the usual steam elevators, steam breakers for scrap. Stow flexible tube cleaners, steam rattlers, pneumatic rammers, etc., together with the customary electric crane equipment and other labor saving devices. The cabinet shops likewise are well equipped, there being found therein practically every type of cabinet making machinery extant. A novel feature of the Harlan & Hollingsworth plant is the upholstering department where not only is the construction of all furniture for ships carried on, but all the linen for vessels is made and marked as well. The handling of material throughout all the works is facilitated by net work of tracks connecting the various shops and on which there is in service an electric locomotive capable of hauling a small train, and the motor of which is supplied with power by its own engine and dynamo. Floor and overhead tracks are found in all the shops and gib cranes and hoists are stationed at convenient points.

There are five erecting shops in the plant, of which the one in the western part of the yard may well be taken as an example. Its power plant, which occupies a separate building, includes a 250-horse-power Corliss engine for running the general machinery, a 125-horse-power en-

The set of masting sheers at these works has few equals in American ship yards. The greatest possible strength of construction was embodied, and the work upon the whole structure the company retained in its own hands in order to insure the most perfect and substantial tool possible. The height of the stationary legs of the sheers is 84 feet and the "reach" from the perpendicular is 50 feet, while that of the leaning pair of legs is 35 feet beyond the wharf front. It is claimed that this set of sheers is the only one in the United States which are capable of lifting 150 tons dead weight without exceeding the elastic limit, the extreme capacity of the sheers being 356 tons dead weight. There are in the yard eleven wooden gaff derricks, three of them being of three tons capacity each and the remaining eight having a capacity of two tons each.

Contrary to the English and some continental usages, the practice of the Harlan & Hollingsworth Co. in planning a ship has always been to prepare first their estimated tables of displacement, and then shape out a block into the approximate form and size required to caliper to the required displacement, after which and the actual tonnage at the desired draught has been determined by a detailed examination of the weights to be created, the approximate model embodying as it does all the principles of stability, entrance, run, flare, sheer and body balance desired, is smoothed and "faired" down to the exact point of displacement aimed at. With the model approved the course in the mold loft becomes the normal one in use elsewhere, except in two minor particulars, namely, that an improved scribing device is employed in connection with drawing in the frames and other sectional curves upon the floor, and secondly, that only



ELECTRIC GANTRY CRANE (CAPACITY 7 TONS) AT HARLAN & HOLLINGSWORTH CO.'S YARD.

gine for the blowers and a 150-horse-power engine for supplying electric current for lighting purposes. The boilers aggregate 600 horse power. The lower story of the building is used for working heavy timbers, while the upper floors are utilized as a cabinet shop for large work. All the electrical apparatus required on the vessels constructed at these works is manufactured on the premises and set up by the company's own electricians. A very novel department is the carving room, where thirty first-class carvers and their journeymen turn out the most elaborate designs in hand carving for the ornamentation of ships. The excellence of the work of this character turned out by the company is well attested by the fact that many of their carved productions adorn the Congressional library at Washington. It has also been the custom of the company to secure for exhibition and mural decoration of the office an ornamental model of every vessel turned out at the yard.

A distinctive feature of the ship yard is the system of plate racks and the method of handling material. There is provided a large circle of upright cast-iron toothed post frames, between which the plates stand on edges. Into or out of these racks they are raised quickly and neatly by a clamp device, which automatically adjusts its grip in proportion to the weight of the sheet to be handled, and which is swung from a central derrick. Thus but one operation is required for the transfer of the plates from the railroad car to a place in the racks. The equipment of shops adjoining the ship berths with all manner of tools, including heavy plate rolls, plate shears, punches, planers, drill presses, beam bending machines and pneumatic machinery of all kinds is very complete, and there are four furnaces for heating plates, beams and angles.

wooden molds or battens are used as pattern in bending the frames and other angles. All molds are sawed out by machinery located in the mold loft and run by a special engine.

The building ways are of the stanchest construction and rest upon the soundest foundation that could possibly be obtained. On the fixed ground they are bedded and secured beyond all question, and over the softer soil and tide way of the stream they are founded upon oak piles. The ways are arranged upon nearly parallel lines, each inclining at an angle of perhaps 10 or 15 degrees up stream, so as to allow the greatest possible distance for steamers to float away before being brought up by the snubbing lines. The fact that the record of the Harlan & Hollingsworth Co. shows a total absence of accident, to life, limb or property by reason of a launch throughout all the years of its business career, speaks volumes for the precautions taken for the supporting, balancing and holding on of every vessel. The methods of "packing up," greasing, shoring, etc., are those in ordinary use at most ship yards, but the manner of getting a ship overboard differs in some respects from the customary practice of many builders. The wedges, at a signal, are first driven in, thus raising the ship sufficiently to relieve the strain upon the blocks. These are then split from end to end of the vessel. Allowing the whole weight to rest upon the sliding or launching ways, which in turn lie upon the permanent or "ground" ways. The ship would, of course, break away at this stage of the proceedings were it not for a thick cross-bracing of tough timber at her bow. The launching cradle is lashed together under the keel by strong rope "toggles" from side to side at intervals toward the bow. After the blocks are split, the shore braces are knocked

down one by one, and finally the cross-braces, which secure the two sets of ways, are sawed asunder. In anticipation of any emergency in securing a favorable start, a 60-ton hydraulic jack is placed under the forefoot of the stem, in order that the bow may be lifted to give the vessel an impetus on the slide. When once afloat the ship is checked by snubbing lines. No buried anchors are used, as is done in many of the ship yards of Great Britain and the continent. The fact that no other means than the snubber is employed, is unquestionably due in a great measure to the soft deposit of mud upon the opposite margin of the stream, into which the ship may be launched with perfect safety. Records at the Harlan & Hollingsworth yard show that the time consumed between the signal for wedging and the actual start varies from 7 to 8 minutes in the case of small craft, to 15 or 20 minutes for the largest vessels.

The gantry crane herewith illustrated, which is operated by electricity and has a capacity of 7 tons, travels over the entire length of No. 3 ways and covers that portion of the yard used for the fitting up and riveting of the frames and bulkheads of vessels. The lumber department consists of a yard covering 15 acres of ground and including four lumber sheds, with a combined capacity of 7,900,000 feet, and a complete system of dry-kilns, with storeroom attached, holding 500,000 feet of dry lumber. A stock aggregating from 5,000,000 to 7,000,000 feet is kept constantly on hand, there being represented more than sixty different varieties of wood, from rare and costly mahoganies to oak, ash, pine and other common stuff. The size of the dry-kilns and storerooms is such that the company

pumps are in proper condition day and night, and who insures having steam by which to run the pumps by keeping a continuous pressure of 100 pounds on one of the boilers.

The reputation of the Harlan & Hollingsworth Co. as builders of staunch, efficient craft, ranging in scope all the way from the huge, partially-fitted passenger vessels for coastwise service to light-draught, high-powered speedy pleasure craft, is well known. Were it otherwise a simple rehearsal of the vessels which the company has turned out would attest it. Some of the more notable vessels (each illustrative of a distinct type) which have been constructed at the company's yards are the steamer Maine of the Providence & Stonington line; steamer Richard Peck of the New Haven Steamboat Co.'s fleet; ferry boat Cape Charles, built for New York, Philadelphia & Norfolk Railroad Co.; Merchants' & Miners' Transportation Co.'s steamers Howard, Fairfax and Juniata; Joseph Stickney's steam yacht Susquehanna; steam pilot boat New York; William K. Vanderbilt's yacht Alva; the Howard Gould yacht Niagara; the Alcedo, owned by George W. Childs Drexel of Philadelphia; H. M. Flagler's handsome yacht Alacia; the tug Gettysburg, owned by the Philadelphia & Reading Railway Co., and the tug Anson M. Bangs, owned by Hughes Bros. & Bangs of New York; also the ferry boat Sandy Hook for the Central Railroad of New Jersey.

The record of the Harlan & Hollingsworth Co. for the year ending July 1, 1899, has been one of the most remarkable in the history of American ship building. More than a dozen vessels, almost all of them of large



EXTERIOR OF MOLD LOFT AND TOOL SHOP AT THE SHIP YARD OF THE HARLAN & HOLLINGSWORTH CO.

is enabled to keep constantly on hand a very large amount of dry lumber suitable for use in all kinds of cabinet, joiner and mill work. A complete trolley system, which extends to every part of the yard, facilitates the handling of this material. From 3,000,000 to 4,000,000 feet of lumber is used annually.

The store system at these works is admirable. The main store is a building two and a half stories in height and 45 by 60 feet ground space. The books are kept after the fashion of a regular retail hardware and shipchandlery store, and the method of administration followed is similar to that in vogue in such establishments. Sales are all registered and must be based upon authenticated requisitions from a foreman or other authorized official. Daily returns are made to the main office and an effort is made to avoid error by a system of checks applied to invoices and their distribution. The stock of material carried usually averages from \$60,000 to \$80,000 in value.

The ship yard is well protected from fire. In every building are automatic sprinkler heads, placed in squares of 5 feet in the ceilings. These sprinkler heads, aside from being connected with the city water mains, have a pressure of 60 pounds to the square inch and are also connected to an independent pipe system entirely distinct from that of the city. The separate pipe system is fed from two Worthington fire pumps, delivering 2,000 gallons of water per minute, and which draw their supply from the Christiana river through two 14-inch mains. In each building there is an automatic attachment, which, as soon as a sprinkler is discharged, starts ringing a large gong on the outside of the building, and at the same time registers in which building the fire is located, by means of a tell tale in the superintendent's office, thereby notifying the engineer in charge. There is an engineer whose especial duty is to see that the fire

size, have been built or contracted for, and so severely has the capacity of the yard been taxed that additional ways have had to be built and the machinery equipment heavily increased. A vessel to which special interest is attached, and which has been launched within the year, is the Stringham, the largest torpedo boat built or building for the United States government. This vessel is 225 feet long, 22 feet extreme breadth, and at 6 feet 6 inches mean draught displaces 340 tons. The design in its general features follows the English type of boat, but it is not a close copy of foreign plans. There are four Thornycroft water tube boilers, exhausting into three stacks, the two middle boilers having a common stack. The engines are twin-screw, vertical, inverted, triple expansion, designed to indicate 7,200 horse power, which is expected to drive the boat at least at the guaranteed speed of 30 knots. Her allowance of coal at normal draught is 35 tons. Her bunkers will stow 120 tons. In addition to the Stringham the Harlan & Hollingsworth Co. have the following vessels under construction or contracted for:

Ponce and San Juan for the New York & Porto Rico Steamship Co.—335 feet over all; 42 feet beam, moulded; 19 feet draught; 3,250 tons; six water tight bulkheads; accommodations for seventy-two first-class and twenty second-class passengers; large freight carrying capacity; engines direct tri-compound, 24, 38 and 62 inches diameter and 42 inches stroke; two Scotch boilers, 14 feet 6 inches by 11 feet 6 inches, with 48-inch furnaces; to have a speed of 12 knots; to run between New York and Porto Rico.

Steamer Maracaibo for the Red D line, to run between New York and South American ports; freight and passengers; built under the American Shipmasters' rules; 277 feet 6 inches over all; beam moulded, 37 feet; draught 10 feet; seven water tight bulkheads; accommodations for eighty-

four passengers; two triple expansion engines, 14, 22 and 36-inch cylinders with 24 inches stroke; speed, 12 knots; two Scotch boilers, 12 feet 3 inches by 12 feet 6 inches with 40-inch furnaces.

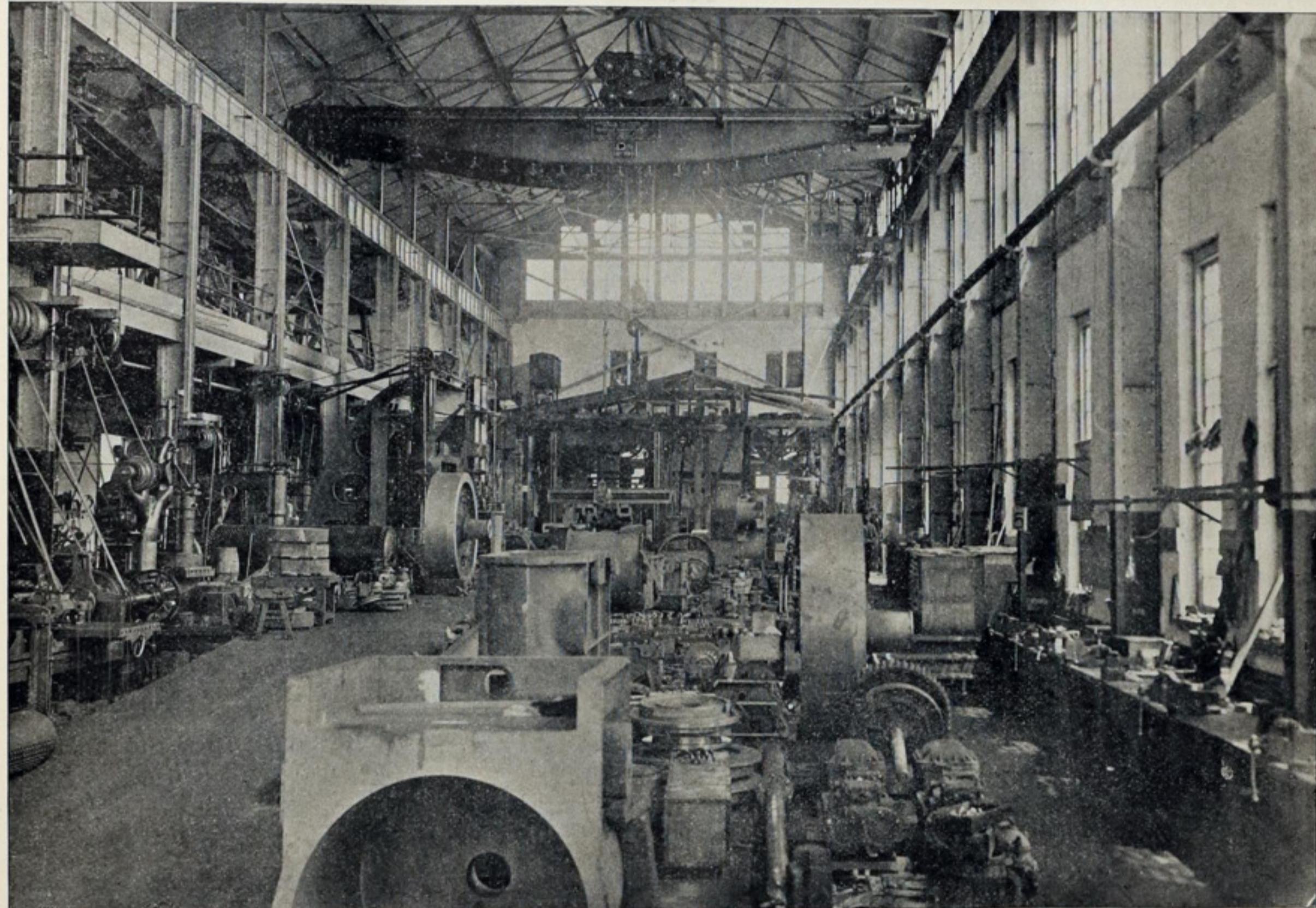
Steamer Nantucket for the Merchants' & Miners' Transportation Co. of Baltimore, Md.; to run between Baltimore and Boston; 294 feet over all; 42 feet beam; 18 feet draught; 2,600 tons measurement; dead weight carrying capacity, 2,000 tons; ample accommodation for first and second-class passengers; engines 28, 45 and 72 inches diameter and 54 inches stroke; four Scotch boilers, 14½ feet by 12 feet 3 inches; furnaces each 50 inches diameter; speed, 16 knots.

Steamer Grecian for Boston & Philadelphia Steamship Co., known as the Windsor line; freight and passengers; building under the United States Standard Register rules; length over all, 290 feet; beam, 42 feet; draught, 18 feet; large freight accommodations; one hundred passengers; inverted triple expansion engine, 25, 41½ and 68 inches diameter and 42 inches stroke; four boilers, 12 feet by 10½ feet; two furnaces to each boiler, 40 inches diameter; speed, 15¾ knots.

Two torpedo boat destroyers, Hopkins and Hull; 244 feet over all; beam, 23 feet 1½ inches; draught, 6 feet 6 inches; two direct-acting triple-expansion engines of 23, 32½, 34 and 34 inches diameter of cylinders, with 18 inches stroke; four Thornycroft boilers; manganese bronze propellers; speed, 29 knots. These boats, while they have a trifle less speed than the Stringham, have practically the same engines and are of the destroyer class, having five 5-pounders and two 12-pounders on the conning tower.

#### MOST POWERFUL TOWBOAT ON WESTERN RIVERS.

The Pittsburg Transportation Co.'s new towboat Transporter was launched from the Elizabeth, Pa., marine ways last Saturday. The Transporter is the largest and most powerful towboat ever constructed for use on the Ohio and Mississippi rivers, and will be in many other respects the finest towboat afloat. She is 240 feet over all and 210 feet on deck. Her beam is 42 feet but her width over all is 53 feet, and her depth 5½ feet. She will have seven boilers, each having two flues, the length of the boilers being 28 feet and the diameter 40 inches. The boilers will be arranged in two batteries, so that in going down stream, or whenever desirable, she can clean out part of them without the boat having to stop and cool down as all the other towboats have to do. She will have an auxiliary or "nigger" boiler for the various purposes for which these are used. Her engines are by far the most powerful of any river steamboat now in existence. They are compound, the high pressure cylinders being 21 inches in diameter and the low pressure 44 inches, with 10-foot stroke. She will be equipped with a surface condenser, and all the water that will enter her boilers will be filtered. She will be lighted throughout by electricity, and will have two very powerful search lights on her head. Her cabin will be well furnished and will contain bath rooms for both officers and crew. The engine shaft is 15 inches in diameter in the journals, and the wheel will work a 30-foot bucket. Complete with all her rigging of ratchets and chains, ropes, siphons and other outfit, the Transporter will cost within a small sum of \$100,000. She will be used to tow in



UPPER HALF OF THE HARLAN & HOLLINGSWORTH CO.'S MACHINE SHOP, WILMINGTON, DEL.

Two freight steamers for the New York & Baltimore Transportation Line; 219 feet over all, 32 feet beam, 13 feet 6 inches draught; triple expansion engines of 18, 28 and 45 inches diameter of cylinders, and 30 inches stroke; speed, 12 knots, loaded; two Scotch boilers, 11 feet diameter, 10 feet 6 inches long; two furnaces to each boiler, 46 inches outside diameter. On the day of the Stringham's launch, the keel of the first of these vessels was laid on the Stringham's ways before the guests left the yard, showing how expeditiously the work is being carried on.

Freight and passenger steamer for the Metropolitan Steamship Co.; 288 feet 8¾ inches over all; 43 feet beam, moulded; 19 feet depth; engines, triple expansion, 29, 46 and 75 inches diameter of cylinders with 46 inches stroke; four boilers, 13 feet long and 14 feet diameter, with three cylindrical furnaces in each, the outside diameter of which is about 48 inches.

The average-adjusting and fire and marine insurance brokerage business of the firm of Johnson & Higgins of New York, will hereafter be conducted by a corporation organized under laws of New Jersey and styled the Johnson & Higgins Co. The new company will take over all the business of the old firm, except as to Boston, Philadelphia, Baltimore, New Orleans, Chicago and San Francisco, which will be conducted as heretofore. The capital of \$500,000 is all paid in. Officers of the new corporation are: President, Wm. Kerbs; vice-presidents, J. D. Barrett, John H. Gourlie, James B. Rickson, Stephen Loines, William W. Curtin, Wm. E. Lowe and Wm. Brockie; treasurer, James B. Rickson; secretary, Stephen Loines.

barges, coal, steel rails, nails and other manufactures from Pittsburg to New Orleans, and her builders hope to handle iron products so cheaply that they can develop a good trade for the export of these things from New Orleans. It may be a matter of surprise to many of the readers of the Review to learn that there is now one towboat on the Mississippi river that has taken over 50,000 tons of coal in one tow from Louisville to New Orleans.

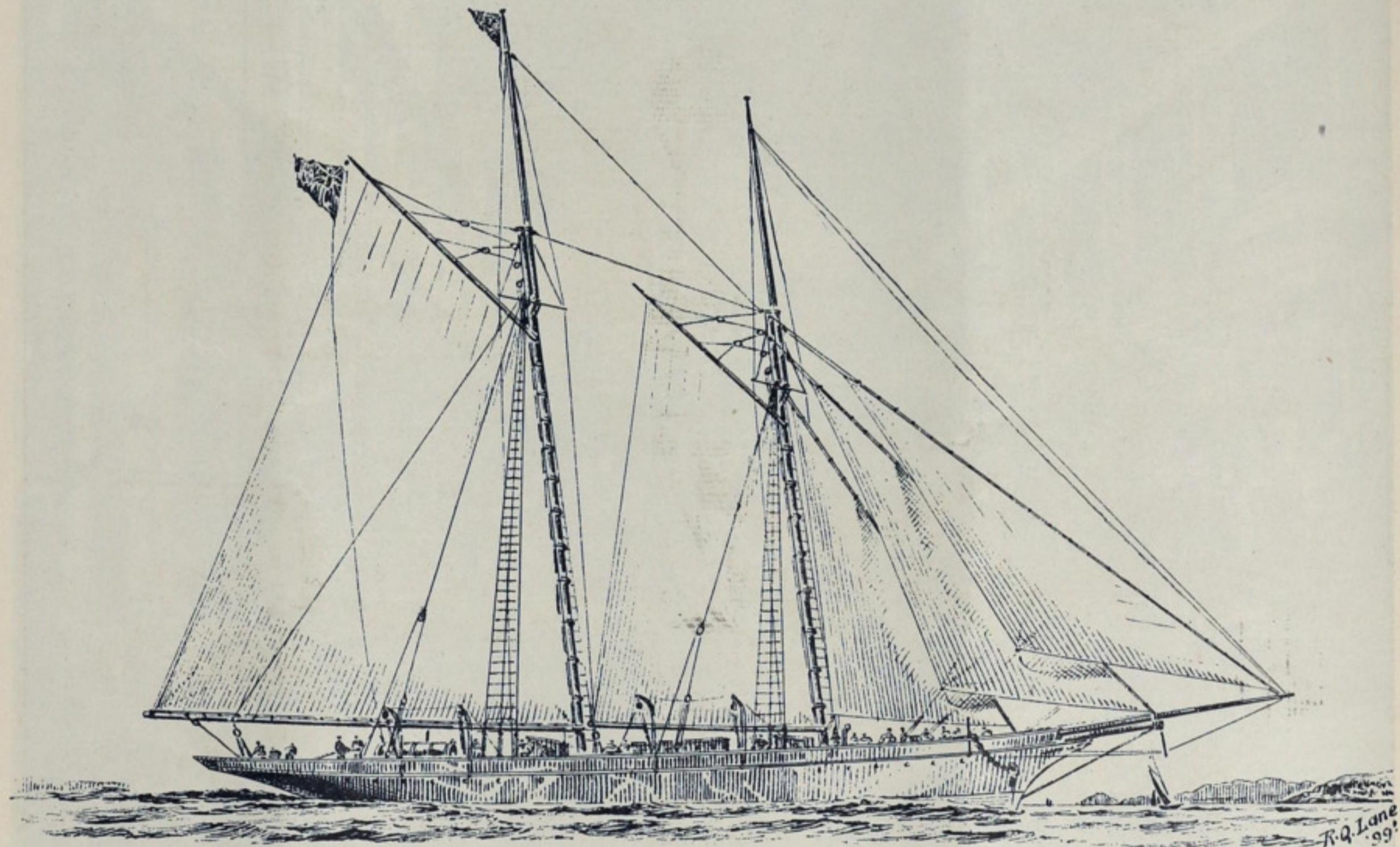
A number of changes have been made in the plans for the six new cruisers of the Denver class, recently described and illustrated in the columns of the Review. Objection was made in the navy board of construction to having these vessels totally unprotected, and after considerable discussion it was decided to provide a protective steel deck of at least 2 inches thickness. This deck will be turtle-shaped, and will go well down below the water line, covering the machinery. It will also extend nearly the entire length of the vessel. The addition of such weight as will be necessary in the protective deck has, of course, entailed some other changes in the plans of the cruisers, but they are of a minor character.

A highly creditable showing was made on trial by the recently completed British cruiser Highflyer. The mean results were: Steam in boilers 250 pounds; at engines, 223 pounds; vacuum, starboard 25.4 inches, port 26.1 inch; revolutions, starboard 169.7, port 168.1; indicated horse-power, starboard 3828, port 3816—total, 7644; air pressure, nil; speed, 19.4 knots; coal consumed per indicated horse-power per hour, 1.49 pounds.

## THE SITUATION IN YACHTING.

The Review reproduces herewith two very interesting pen drawings by R. Quiller-Lane, the English artist. The one represents the schooner-yacht Gleniffer, recently completed for Mr. James Coats, Ferguslie House, Paisley, Scotland, and which enjoys the distinction of being the largest sailing yacht in the world. The vessel, which, as will be seen, is of trim appearance, was designed by the well known G. L. Watson of Glasgow, and is a product of the yard of D. & W. Henderson at Patrick, a combination which would seem to insure for her the embodiment of the most approved British practice in design and construction. The Gleniffer is built of steel, is 185 feet in length and of 500 tons yacht displacement. She is entered in the highest class in Lloyd's Yacht Register. She has just reached Gourock from her builders.

The other drawing brings out some points of interest in connection with the yacht Shamrock, the America's cup challenger, the launch of which is of recent occurrence. Yachting circles in the Solent appear to have passed very favorable judgment on the new boat, which, during the helm trials, demonstrated her ability to answer all demands in a thoroughly satisfactory manner. Reports as to the design of the challenger are, of course, meagre, owing to the great efforts made for the preservation of secrecy. A correspondent writes that so far as could be judged from the very short time that the vessel's under-water body was visible, there is no radical departure in regard to shape. There is the usual long counter, raking stern-post and overhang forward. The profile of the bow slopes easily and gradually aft until about a third of the length is reached, when the outline takes a sudden dip down almost in a vertical line. The



SCHOONER YACHT GLENIFFER—LARGEST SAILING YACHT IN THE WORLD DESIGNED BY WATSON.

Shamrock is by no means a narrow craft and the keel is slightly bulbous in form. Lloyd's have been asked to insure the entire yacht, the value for insurance purposes being given as \$200,000.

Discussion regarding the coming international yacht race has caused some speculation as to the whereabouts of former defenders of the America's cup. The original schooner-yacht America was practically rebuilt a few years ago and is now in commission. The Magic, which raced against the first challenger for the cup in 1870, is now the property of a Pittsburgher. The Columbia of 1871 is in Philadelphia. The Madeline and Mischief of 1876 and 1881 still hail from New York. The Puritan, the Mayflower and Galatea are all in commission, as is also the Vigilant, while the Defender has of course been racing against the new Columbia, demonstrating the superiority of the latter vessel.

On July 8 was noted the expiration of the famous Eads jetty contract, made between the United States government and Capt. James B. Eads in 1874, and in which Capt. Eads agreed to keep a channel at least 26 feet in depth at the mouth of the Mississippi river. The Eads estate will, however, have to keep the jetty open for 535 days additional, to make good deficiencies in the fulfillment of contract. The greatest draught ever recorded was that of the Hamburg-American liner Adna, which a few days ago went through the jetties drawing 26 feet 10 inches of water and did not touch.

The construction of a large new dock basin, which was begun last year at Hamburg, Germany, is now well under way. The dock, which is to cost more than \$5,000,000, will be 558 feet in length and 84 feet beam, and can be used by any vessel the draught of which does not exceed 29 feet. The dock is being constructed so that it can be easily floated to Cuxhaven in the event of war.

## ENGLAND GIVES UP LIQUID FUEL.

Immediately following the completion of preparations for experiments with liquid fuel on the United States Torpedo boat Talbot, comes the announcement that oil fuel trials in the British torpedo boat destroyer Surly have virtually been abandoned. The claim is made that unless some arrangement can be devised for consuming the smoke, the use of oil is impracticable, and thereupon the British sit down, figuratively speaking, to wait until something is invented. The policy of British engineers with regard to innovations in the marine field is, to say the least, exceedingly conservative of late. With the present-day changes in engineering lines, it would seem that the construction and operation of ships should share in some of the radical advances that are being made, but with this spirit the British technical public appears to be strangely out of sympathy. The apathy of Great Britain in this regard, with all her ships and ship building interests is well illustrated by events within the year. Rear Admiral Melville's advocacy of triple screws was greeted with skepticism, the possibilities of the submarine boat were disparaged after a superficial investigation, and finally now the solution of the liquid fuel question is abandoned after a first unsuccessful attempt. There can be little doubt that the coming century holds great opportunities for the development of both submarine craft and oil fuel, notwithstanding the position taken by the greatest of the world's maritime nations.

Meanwhile, to return to the subject of liquid fuel, it is offered in explanation of the abandonment of experiments on the Surly that the vessel only went to sea once and then it was found that owing to the low evaporative qualities of the oil the speed and power were far inferior to

what would have been produced by coal. It was hoped by improved appliances to so obviate the escape of heat that this difficulty would be overcome, and this was in a measure accomplished, but the question of smoke abatement remained as a bugbear. Mechanical devices were tried, but all to no avail. To sum it up there was no difficulty in satisfactorily consuming liquid fuel with fairly economical results as to the consumption in proportion to the steam raised, but the difficulty of burning sufficient fuel and raising sufficient steam to keep the engines going at top speed, as well as reducing instead of increasing the density and dirtiness of the smoke, was in no sense overcome. Two of the Surly's boilers were adapted for liquid fuel and two for coal, and thus the liquid fuel had to compete with coal fuel under artificial combustion. The competition was not one of securing economy but of securing the maximum amount of power and consequently raising the maximum quantity of steam in boilers of limited size.

On the other hand some of the British officers are constrained to admit that liquid fuel may prove a most excellent adjunct in the merchant marine, and indeed it would be well nigh folly to dispute it in the face of Russian experience. In its use in the mercantile marine the economy of fuel consumption which the British assert has been totally disregarded in naval trials would become a big item. It is significant, too, that some of the more progressive of the British engineers point out that if there is one fact regarding liquid fuel which is clear of controversy it is its availability for combustion under proper conditions with absolutely no visible smoke, and thus there is manifest in certain quarters in England a strong tendency to attribute the large volumes of black smoke which the Surly is alleged to have emitted, to either faulty furnaces or incompetent engineers. In evidence of the use of liquid fuel in Russia, where the cost is low, it may be noted that at the present time 200 steamers on the Caspian and 1,000 steamers on the Volga, comprising practically all the steam vessels on those waters, use the petroleum. The total consumption in all lines has reached 4,840,000 tons per annum.

## STEEL HOPPER DREDGES.

TWO IMMENSE VESSELS OF THE BRITISH SUCTION SEA-GOING TYPE WILL BE BUILT FOR A JOB OF DREDGING IN NEW YORK HARBOR INVOLVING THE REMOVAL OF 49,000,000 TONS OF SAND—A WORK FOR WHICH CONGRESS HAS APPROPRIATED \$4,000,000.

New York harbor's new ship-channel will be dug by two mammoth dredges of the British suction tube type. The contract for the construction of these vessels, which it is estimated will cost \$500,000 each, will be awarded to a coast ship building firm in a few days. Congress has appropriated \$4,000,000 for the purpose of making the east channel 40 feet deep and 2,000 feet wide. The length covered by the proposed dredging operations will be fully six miles. Government engineers estimate that it will be necessary to excavate 39,000,000 cubic yards or 49,000,000 tons to make the east channel fit the specifications. Borings have shown that the dredges will encounter nothing but sand and mud, and the contractor, Mr. Andrew Oderdonk, says that the finding of rock is highly improbable.

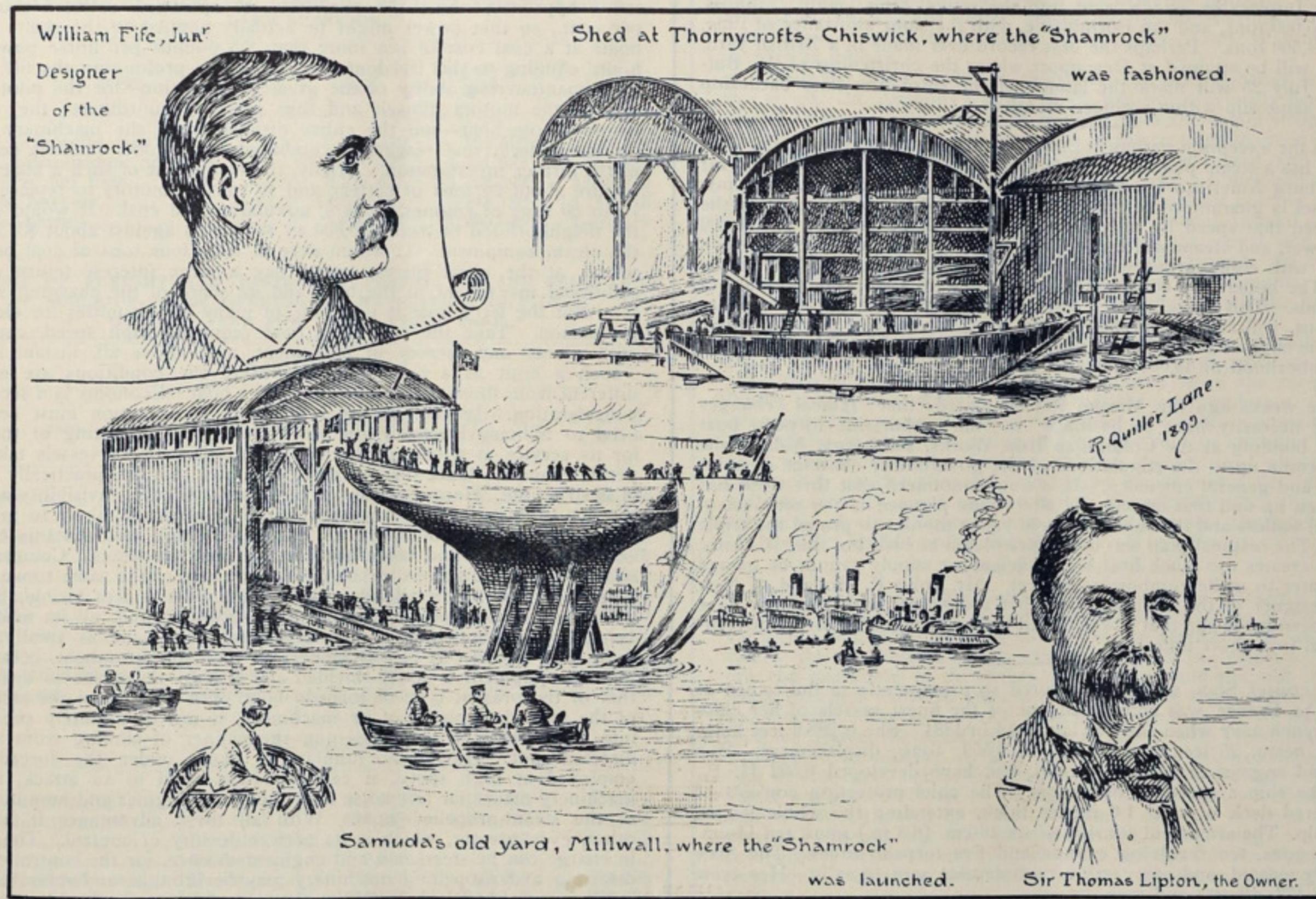
The new dredges will be ocean steamships. They are 320 feet long, 48 feet beam and 21 feet 6 inches deep. The sand which they bring up through their 4-foot suction tube will be delivered into eight large hoppers, located amidships. These vessels will carry over 3,000 tons of sand each in their hoppers, and they will have a pumping plant on board capable of pumping 6,000 tons of matter per hour. Making allowance for

of the hopper. It is ejected in a series of jets from a set of pipes. The pipes receive their supply from the circulating pumps. Gear for controlling the speed of the sand pumps is in a small house on the steering bridge, where there are also indicators to show the depth of the nozzle of the main suction tube and the pressure on the hydraulic main. There is an automatic apparatus, by means of which the suction tube is balanced, so that with the ebb of the tide the end of the tube shall rise or fall as the sand is removed. The pumping engine for the hydraulic gear is a two-cylinder compound engine with double-acting pumps.

The vessels are double-enders, with a large rudder at each end, both of which may be worked by steam or hand screw gear. A crew of about forty-five men will be carried on each boat, and first-class accommodations for the men are located in the forecastle and poop. A large electric plant with two searchlights, steam windlass, steam winches, steam steering gear, evaporator and other desirable auxiliaries will be fitted, so as to make these vessels the largest and finest ocean-going dredges in the world.

## NEW CAMDEN SHIP YARD.

Active operations in the establishment of the new yard of the New York Ship Building Co. at Camden, N. J., began last Saturday. The tract of land, which, by the way, is valued at \$176,000, was staked off and surveyed. Permits have been taken out for the construction of nine buildings and work upon them will begin at once. Six of the buildings



YACHT SHAMROCK, WITH WHICH SIR THOMAS LIPTON HAS CHALLENGED FOR THE AMERICA'S CUP.

the speed of average working, and for the time required by the big dredges to take their loads eight miles out to sea and dump them, it will take, as a rough estimate, 750 days of twenty-four hours each to carve out this new waterway. The vessels will be of steel, self-propelling, with twin-screw, triple-expansion engines, capable of driving them at a speed of ten knots loaded.

For pumping the sand there are two large centrifugal pumps, having 36-inch suction and delivery pipe, each worked by a triple-expansion engine. The pumps, placed on each side of the center well, draw from a T head at the top of the suction pipe. This T head also serves as a trunion around which the tube can swing, so that it can be raised or lowered at will. Fitted to the suction tube close to the T head is a ball and socket joint, which gives a motion sideways. The nozzle of the pipe has its aperture nearly at right angles to the axis of the tube, and is so arranged that nothing of sufficient size to choke the pumps can pass through it. Each centrifugal pump may be disconnected in case of accident and the other pump may be worked alone. By means of a hydraulic apparatus, the suction tube is raised and lowered. The tube is long enough to enable the vessels to dredge in 47 feet of water. The suction tube is also fastened by chains and other gear, by which it may be lifted in case of accident to the hydraulic apparatus.

Along two landers, one opposite the delivery of each pump, a mixture of sand and water drawn from the channel is discharged into the hoppers. The flow of the mixture is so regulated that the port and starboard hoppers are filled simultaneously. Each hopper has a discharging door. The aperture is closed by a valve which opens upward, and is surrounded by a slightly-tapering trunk, which extends upward to the top of the hopper. The sand is cleaned out of the hopper by means of water, which is supplied through the center of the discharging valves. The fluid is thrown out through a round aperture about 5 inches above the bottom

are one-story structures of brick and iron construction, and are of the following dimensions: 92 by 180 feet; 156 by 557 feet; 184 by 557 feet; 412 by 940 feet; 50 by 100 feet, and 115 by 130 feet. The three one-story wooden buildings are 60 by 200 feet; 50 by 150 feet, and 50 by 132 feet. The 940-foot building approximates the length of three ordinary blocks and will probably be the largest building in America devoted to ship building purposes. As has been previously stated in the Review, the tract of land occupied by the new company has an area of 120 acres and a frontage of 3,500 feet on the Delaware river, there being along the entire front a depth of 40 feet at low tide. The Pottstown Bridge Co.'s works at Pottstown, Pa., were purchased some time ago by persons interested in the ship building company and the material for the buildings is being worked up there. More than 7,000 tons of steel for construction has been contracted for and 3,000 tons have already been rolled and delivered at the Pottstown works. About 10,000 piles have been purchased for foundation work in the ship yard and delivery of a large consignment has already been made.

Capt. Randle, formerly of the American liner St. Louis and now general superintendent of the New York company, is more than enthusiastic over the prospects. He says that the location is ideal and that the company will have within a year or two the largest ship building plant in the world. In speaking of the location Capt. Randle said: "We have one of the best sites in the world—over 40 feet of water at our launching slips, a clean bed of sand and gravel and not an atom of mud anywhere. We shall have one of the largest dry docks in the world, 860 feet in length, although whether of stone or wood is not yet settled." It is anticipated that more than 1,000 men will be at work at Camden within a few weeks, and the yard when in operation will undertake to build ships of every description.

# MARINE REVIEW

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English ship builders are vigorously disputing the claim on the part of the French that the rapidity of construction of British battleships had been beaten in the case of the *Inea*, which was launched in less than eight months. The English authorities contend that the real test is found in the number of tons of material worked into the vessel at the time of her launch. Thus while the *Inea* is a 12,050-ton battleship, she represented but 3,580 tons when she went into the water. Taking some of the British vessels on which the best showing was made, it is noted that the *Ocean* was launched at the end of sixteen months but weighed 8,000 tons at the time; the *Implacable*, which went into the water after eight months, weighed 5,000 tons, and the *Formidable*, with the same allowance of time, weighed 4,500 tons. Perhaps the best record ever made in a British yard, however, will be attained at Devonport where the christening of the *Bulwark* on July 25 will mark the launch of the third first-class battleship from the same slip within eighteen months.

With the exception perhaps of the *Oceanic*, no vessel now under construction has a steam plant so remarkable as the *Deutschland*, building for the Hamburg-American Co. at the Vulcan Co.'s yard at Stettin, Germany. This vessel is guaranteed to make 23½ knots, and her builders claim she will exceed that speed by fully a knot. She will be engined for 35,000 horse power, and steam will be supplied from twelve double boilers, each provided with eight furnaces, and four single boilers, each with four furnaces. The boilers are constructed with a view to a working pressure of 225 pounds. This vessel, which exceeds all other save the *Oceanic* in dimensions, will also be surpassed only by that vessel in point of horse power, the engines of the *White Star* giant being capable of developing in the neighborhood of 45,000 indicated horse power.

Some weeks ago the *Marine Review* stated that radical changes would of necessity have to be made in the submarine torpedo boat *Plunger*, building at the Columbian Iron Works, Baltimore, Md., if she were to come up to the stipulations of the government contract in point of speed and general efficiency. It is now announced that this work has been taken up and that among the alterations planned is the removal of the steam boilers and the substitution of vapor motors to propel the triple screws. The original plan was to use petroleum as fuel, but this, it seems, not only creates too much heat but sufficient air supply cannot be gained under water to make combustion perfect. Mr. John P. Holland of New York, designer of the *Plunger*, says that some tests with the boat have already been made and that it was hoped to have her ready for the government trial in a short time.

The cruiser *Sfax*, which has figured so prominently in the return of Dreyfus to France, was considered one of the finest vessels of her class in the French navy when she was launched in 1884. She is 288.6 feet long, 49.2 feet beam, 25 feet draught and of 4,500 tons displacement. Her compound engines drive twin screws, and have developed 6,522 H. P., giving the ship a speed of 16.7 knots. The chief protection consists of an armored deck of steel 1.6 inches thick, extending the whole length of the ship. The armament consists of six 16-cm. (6.3 in.) guns, ten 14-cm. (5.5 in.) guns, ten revolving cannon and five torpedo tubes. The *Sfax* is heavily masted, and can carry a considerable area of sails. Her crew numbers 473, officers and men.

There is much promise of beneficial results from the scheme which has been urged by Lloyd's and other influences (and which is understood to now have the support of the British admiralty) to keep two war vessels constantly employed destroying abandoned vessels on the Atlantic ocean, in which work, if report be credited, a United States gunboat will also take part. The plan proposed is that one British vessel patrol the Nova Scotia and Newfoundland coasts and the other search for derelicts along the entire coast of the United Kingdom, including the English channel and Irish sea, while the American vessel would cover the territory from eastward of Nantucket shoals to the Gulf of Mexico.

## ELECTRICITY FOR FERRY BOATS.

Chas. T. Child of the *Electrical Review*, writing in the June number of the *Engineering Magazine* on the subject "Electric Power for Marine Propulsion," says that the ferry boat and the torpedo boat offer special opportunities in this regard. He produces quite an interesting argument on the score of applying electricity to such vessels.

"It may be stated at the outset," Mr. Child says, "that electrical motive power is, today, only available for certain extremely limited classes of vessels. The floating structure must of necessity be self-contained and not, like the familiar electric tram-car, only the translating part of a system comprising a stationary source of power and a conducting structure. It must carry its immediate source of power within itself, except possibly in the single case of canal boats traversing a fixed route under exceptional conditions of operation. The electrical equipment needed, therefore, for a vessel which does not traverse a fixed path so that it may receive its electrical energy from a generating station, necessarily comprises either storage batteries in some form, or primary batteries, these being the only available sources of electricity not directly dependent

upon applied mechanical energy. It is almost useless to review the disadvantages of the primary battery, even in its most refined and highly developed form. Its great weight in comparison to its available energy, bulk, generally unsatisfactory operation, and absolutely prohibitive cost, exclude it from consideration. It is then to the accumulator, or storage battery, that the designer of electric vessels must turn for motive power. The development of the accumulator has been gradual but steady, and though far from ideal, the present types are fairly reliable and satisfactory structures.

"An ordinary steam ferry boat, especially one making frequent trips over a short course, as for example those running between New York and Jersey City, is just the kind of craft to which electricity might well be applied. Take the case of such a boat using compound engines of about 1,500 indicated horse power and making trips averaging 7½ minutes each with stops of equal length between. At full speed, engines, boilers and fires are being worked under economical conditions. About one-fourth of the time such boats, on a crowded river, are at half speed—a highly inefficient state of things for the motive machinery. Half the total time they are stopped, the fires still burning and everything ready for the next passage. If a line of these boats should be equipped with electrical propelling machinery and charged from a station ashore as they lay in their slips at the end of each trip, the result would be, if there were boats enough to keep one always in the slip, that the charging station would work on a steady load and could attain the very highest economy of operation. The over-all efficiency of batteries and motors would certainly approach, under the conditions of operation outlined above, 80 per cent., so that power might be actually applied to the shafts of the boats at a coal cost of not more than 2.5 pounds per horse power per hour. Adding to this freedom from vibration, prolonging the life of the boat, manoeuvring ability of the greatest perfection—for the pilot could operate the motors himself and thus perfectly coördinate the movements of the boat—and the entire disposition of the machinery below the main deck, one reaches a combination of good qualities certainly worth further investigation. Briefly, the equipment of such a boat would require about 90 tons of battery and 10 tons of motors to replace about 70 to 80 tons of engines, boilers, auxiliaries and coal. It would cost in the neighborhood of from \$50,000 to \$60,000 as against about \$37,500 for the steam equipment. It would save at least four tons of coal per day, which, at the usual prices, would pay a large interest return on the additional investment in the boat and its share of the charging station.

"But the ferry boat is only one of many opportunities for electrical propulsion. Take the case of a boat requiring high speed, combined with silence and secrecy of movement, and, above all, instant control—such a craft as a torpedo boat. Here the conditions are entirely different from those obtaining in the ferry boat. Economy is a secondary consideration. Indeed, all other elements of operation must be sacrificed to military efficiency—in other words, to the fitting of the boat for its service as a sort of directed projectile. These vessels take desperate chances. Once discovered in an attack they are practically certain of destruction. Hence secrecy of movement, silence, invisibility and the absence of any elements of construction or operation likely to proclaim the presence of the boat, are all qualities of high value in this class of vessel. All these and more the electric boat possesses. Compare, for example, a steam driven torpedo boat with one of the same tonnage and speed operated by electricity. The electric boat is less visible, because it has no smoke pipes, no smoke issues from it, and, all its machinery being below water-line, its free-board may be made as small as safe navigation allows. It is less vulnerable than the steamboat, because its motive equipment is water-shielded and also by no means so delicate as that of the present type of torpedo boat. On account of the small size of the individual pieces of its machinery, it can be minutely subdivided into compartments, thus lessening the danger of sinking from a well-directed shot. Having no funnels to flame under the forced draft employed at high speed, it cannot betray itself in an attack, and its machinery makes far less noise than the flying engines and humming fans of the steam-propelled boat. With all these advantages it has one other, even greater, which is its perfect docility of control. The officer in charge can be steersman and engineer at once, for the control of both directing and propelling machinery may be brought under his hands in small space. And last, and in some ways greatest, is the fact that such a boat would require a smaller crew than the present type, thus reducing the risk of life in an attack with it. But, unfortunately, the electric torpedo boat has one very serious disadvantage—small radius of action. Such boat can be built today, using accumulators of the best present type, and about the size of the smallest sea-going steam torpedo boats, capable of a rush speed of 22 knots or over, with an endurance of only one hour at this speed, while the same battery would give a speed of about 12 knots for 24 hours, or a slow-speed cruising radius of 288 nautical miles.

"The electric launch has become as familiar as the automobile. In all varieties of small pleasure craft the cleanliness, compactness, ease of operation and silence of the electric equipment have earned it a highly respected place. In the few submarine boats that have descended (and come up again) electricity has been successfully used as a motive power. On streams like the Rhine, where one end of the ordinary passenger steamboat course is marked by water power, furnishing locally a low-priced source of energy, the advantages of electric propulsion might be worth investigation."

A place is to be found in Independence hall at Philadelphia for a model of the *America*, the first line battleship of the American navy, which was built at Portsmouth, N. H., had seventy-four guns, and in 1782 was presented to France. The model was carved in 1777 by Joshua Humphreys, the naval architect who designed the famous *Constitution*, and who was the first naval constructor of the United States.

A rumor, which was however in no sense authoritative, was in circulation this week to the effect that the American line was considering the purchase of the steamer *Kaiser Friedrich*, recently rejected by the North German Lloyd Steamship Co., to replace the lost steamer *Paris*.

## MORE THAN A MILLION TONS.

INCREASE THUS FAR IN MOVEMENT OF FREIGHT TO AND FROM LAKE SUPERIOR—LARGE INCREASE IN GRAIN BUT MARKED DECREASE IN SOFT COAL.

The canals at the Sault did not open this year until April 29 as against April 11 in 1898, and yet the movement of freight to and from Lake Superior to July 1 of this year is more than a million tons (net tons in all cases in canal reports) ahead of the movement to the same date in 1898. The exact figures are 6,409,086 tons on July 1, 1899, and 5,321,812 tons on July 1, 1898. The one item of special increase is grain, the shipments of wheat from Lake Superior to July 1 of this year aggregating 13,698,691 bushels, against 7,743,183 bushels to July 1, 1898. Of grain other than wheat, the shipments to July 1 foot up 11,473,996 bushels, as against 10,648,127 bushels a year ago. This large increase in wheat, and minor increases in other items, make up for a decided decrease in the movement of soft coal. Soft coal shipments to Lake Superior ports foot up to July 1 only 696,227 tons, against 1,051,328 tons on the same date a year ago. On the other hand the hard coal shipments, which are not however an important item of freight, are more than double what they were a year ago. The shipments of hard coal to July 1 of this year are 257,319 tons; to July 1, 1898, 122,656 tons. Following are the full summaries to July 1 of each year for three years past:

## MOVEMENT OF PRINCIPAL ITEMS OF FREIGHT TO AND FROM LAKE SUPERIOR.

ITEMS.	To July 1, 1899.	To July 1, 1898.	To July 1, 1897.
Coal, anthracite, net tons.....	257,319	122,656	108,179
Coal, bituminous, net tons.....	696,227	1,051,328	761,902
Iron ore, net tons.....	3,917,675	3,722,548	2,566,910
Wheat, bushels.....	13,698,691	7,743,183	15,740,713
Flour, barrels.....	1,600,361	1,995,530	2,467,279

## REPORT OF FREIGHT AND PASSENGER TRAFFIC TO AND FROM LAKE SUPERIOR, FROM OPENING OF NAVIGATION TO JULY 1 OF EACH YEAR FOR THREE YEARS PAST.

## EAST BOUND.

ITEMS.	Designation.	To July 1, 1899.	To July 1, 1898.	To July 1, 1897.
Copper .....	Net tons....	26,135	45,544	44,385
Grain.....	Bushels....	11,473,996	10,648,127	7,734,933
Building stone .....	Net tons....	1,273	3,075	2,818
Flour.....	Barrels.....	1,600,361	1,994,828	2,467,029
Iron ore .....	Net tons....	3,917,675	3,722,548	2,566,910
Iron, pig.....	Net tons...	8,949	11,586	200
Lumber .....	M. ft. b. m.	254,754	243,160	225,319
Silver ore.....	Net tons...	.....	.....	.....
Wheat .....	Bushels....	13,698,691	7,743,183	15,740,713
Unclassified freight .....	Net tons...	48,201	78,005	75,305
Passengers.....	Number....	3,615	2,658	3,003

## WEST BOUND.

ITEMS.	Designation.	To July 1, 1899.	To July 1, 1898.	To July 1, 1897.
Coal, anthracite.....	Net tons...	257,319	122,656	108,179
Coal, bituminous.....	Net tons ..	696,227	1,051,328	761,902
Flour .....	Barrels .....	.....	702	250
Grain .....	Bushels ...	9,500	4,250	.....
Manufactured iron.....	Net tons...	38,295	72,668	34,053
Salt .....	Barrels ....	133,287	114,117	72,454
Unclassified freight .....	Net tons...	115,326	136,178	103,464
Passengers.....	Number ...	4,704	3,823	3,041

## SUMMARY OF TOTAL FREIGHT MOVEMENT IN TONS.

	To July 1, 1899.	To July 1, 1898.	To July 1, 1897.
East bound freight of all kinds, net tons.....	5,281,821	4,931,476	3,987,516
West bound freight of all kinds, net tons.....	1,127,265	1,390,336	1,028,412
	6,409,086	5,321,812	5,015,928

Total number of vessel passages to July 1, 1899, was 5,423 and the registered tonnage 5,873,790.

A late artistic souvenir from the office of B. W. Wrenn, passenger traffic manager of the Plant System, is a copy of the farewell address of Gen. Robert E. Lee, which Mr. Wrenn says he deems not inappropriate as a Fourth of July memento, in view of the fact that the Spanish-American war has obliterated all sectional issues and feelings. The Lee address is accompanied by a handsome lithograph of Gen. Fitzhugh Lee and a picture in colors of the new Plant liner La Grande Duchesse.

The Compagnie Generale Transatlantique, better known as the French Line, is said to have purchased from the Spanish government the auxiliary cruiser Patriota. The vessel, it is said, will be reconverted into a merchant ship, and will take the place of the Bourgogne, lost on July 4 last off the Newfoundland Banks.

## THE RELEASE OF THE PARIS.

Capt. Watkins, his officers and thirty members of the crew of the wrecked American liner Paris, still remain on the vessel, hoping against hope that some means for saving the big liner will yet be devised. Two months' exposure on Cornish rocks has, however, given the Paris very much the appearance of a derelict of years' standing. Pilots are regularly aboard ready to steer the steamer into harbor if she can be freed, but the divers have a slow and dangerous task. The rocks which held the ship are being blasted carefully, and hundreds of tons have already been removed in the effort to enable the divers to reach the main injuries beneath the boiler and engine rooms. Tons of rocks are being placed in the ship's stern in order to tilt up her bows in readiness for high tides when tugs will renew attempts to release her. The Paris is now held for only about a third of her length. The 1,000 tons of coal in bunker No. 5 will be removed, a plate having been taken off the side, in order to facilitate the work. Among the discoveries made by the divers is that the principal leakage is in stokehold No. 1, and a 12-inch pump has been forwarded for use there. It is certainly remarkable that the vessel shows thus far so few indications of straining or weakness.

The report of Capt. Watkins on the stranding of the vessel has been given out by the New York board of steamboat inspectors. He says frankly that the stranding of the vessel was the result of an unaccountable error on his part, in the calculation of the position of the ship. The inspectors have suspended Capt. Watkins' license as a master of ocean steamers for a period of two years, but as above noted he is still in full charge of the wrecked vessel, acting for the underwriters to whom she was turned over by the American line officials. Capt. Watkins' report is in part as follows:

"Fog was discovered to be thick over the land, although there was no fog at sea. St. Anthony's light, which had not previously been seen, appeared bright and clear about 15 minutes after the vessel struck. I regret to say that the casualty was owing to an unaccountable error on my part. It is about 131 miles from Cape La Hogue to the Lizard, and the run between these points would, I calculated, occupy 6 hours and 54 minutes. Unfortunately, I reckoned the time on this basis for coming up with the Lizard from 7:35 a. m., when abeam of the Casquet, instead of from 6:38 p. m., when abeam of Cape La Hogue, and the vessel was thus really eighteen miles ahead of the position I was acting upon. In addition, the thick weather over the land had obscured the Lizard lights. I attribute the stranding to the above cause, and take upon myself the full responsibility for it."

The stranding of the Paris has emphasized the chronic complaint regarding the inadequacy of appliances for salvage work in Great Britain. British engineering journals have been since the recent accident louder than ever in their complaint that the underwriters of the country, who undertake more maritime risks than all foreign competitors put together, should be so easy-going in regard to salvage as to put up with the poor equipment of the London Salvage Association, whose efforts to accomplish anything in the case of the Paris were a flat failure. It is even asserted by some experts that if immediately after the Paris went ashore a salvage steamer equipped with up-to-date appliances had been on hand she could have gotten the liner off in a few days.

## THE PARIS RELEASED.

The German salvagers succeeded this week in releasing the steamer Paris. On June 11 they moved the steamer astern for a distance of 150 yards and shifted her position slightly to the eastward. It was the intention of the wreckers to simply slew the stern of the vessel so as to facilitate the operations of the divers, but it was found that she moved more freely than was expected and the three wrecking boats practically released her unaided. She still shows, however, a distinct list to starboard. As outlined above, the vessel had been weighted with considerable granite, with a view to hoisting her bows, but the divers still had difficulty in getting at the rock, hence the tentative effort to move the steamer. The vessel was gotten off late in the day, and the German wreckers, who were naturally much elated by reason of their success, declined the aid of several Falmouth tugs and decided that the vessel being in a position of comparative safety should remain where she was for the night, the divers meanwhile continuing their work with a view to minimizing the risk of towing.

## CANADA'S MERCHANT SHIPPING.

The latest official returns regarding Canada's merchant shipping have just been received from the Ottawa correspondent of the Marine Review. The total number of vessels of all kinds—sailing vessels, steamers, barges, etc., remaining on the registry books of the Dominion on Dec. 31, 1898, was 6,643, measuring 693,782 register tons. Canada's merchant vessels have been decreasing each year for a great number of years past, both as to number and tonnage. It is shown, for instance, that as compared with 6,643 vessels at the close of last year, the number at the close of 1890 was 6,691, and the tonnage at the close of 1890 was 1,024,974, as compared with 693,782 at the close of 1898. Following is a summary of vessels owned in the different provinces at the close of each of the past four years:

## VESSELS ON REGISTRY BOOKS OF DOMINION OF CANADA.

Provinces.	Dec. 31, 1898.		Dec. 31, 1897.		Dec. 31, 1896.		Dec. 31, 1895.	
	Number of vessels.	Registered or net tonnage.	Number of vessels.	Registered or net tonnage.	Number of vessels.	Registered or net tonnage.	Number of vessels.	Registered or net tonnage.
New Brunswick.....	903	89,257	973	103,584	964	115,506	975	122,417
Nova Scotia.....	2,167	262,176	2,204	283,056	2,669	317,526	2,683	343,356
Quebec.....	1,378	144,447	1,480	158,077	1,469	158,649	1,454	158,776
Ontario.....	1,452	134,180	1,424	135,349	1,525	146,522	1,508	148,669
P. E. Island.....	178	15,979	174	15,812	174	16,540	190	19,323
British Columbia.....	444	40,304	364	28,604	363	26,622	346	25,988
Manitoba.....	121	7,439	115	7,272	115	.....	106	7,307
Total .....	6,643	693,782	6,684	731,754	7,279	789,299	7,262	825,836

**BALTIMORE & OHIO COAL DOCK**

A FAST PLANT AT SANDUSKY, OHIO, FOR THE TRANSFER OF SOFT COAL FROM CARS TO SHIPS—CONSTRUCTION OF ANOTHER SIMILAR DOCK CONTEMPLATED.

Since the receivership of the Baltimore & Ohio Railway, the north-western coal trade of that road has been extensively built up, so that a short time ago it became necessary to provide additional facilities for the transfer of coal from the cars to the vessels. Owing to its location Sandusky, O., has become one of the most important points for coal shipment on the Baltimore & Ohio road. The B. & O. lines from West Vir-

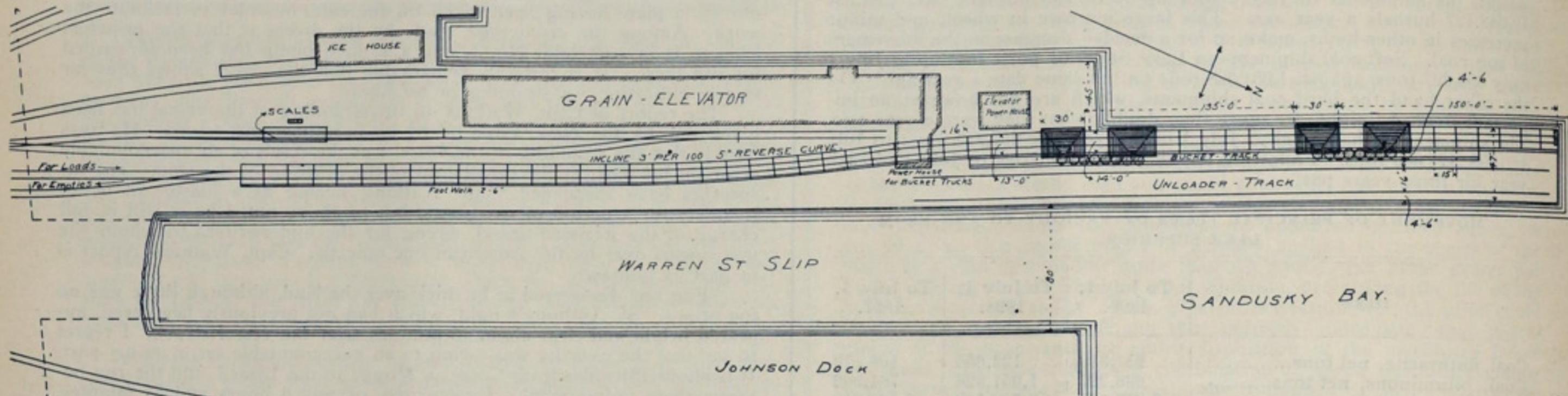


FIG. 1—LOCATION OF COAL DOCKS, BALTIMORE & OHIO RY., SANDUSKY, O.

ginia and from southern Ohio join at Newark, Ohio, and make a straight course for Sandusky. The outlet for coal from the Pennsylvania region is either Cleveland or Ashtabula, but the product of the Monongahela region in West Virginia and of the Ohio coal fields is most conveniently taken through Sandusky for transshipment to the northwest. In studying out the design of a plant for unloading coal at this point it was found to be impracticable to erect a car unloader of the usual type in service at Lake Erie ports, and so a bucket unloader was decided upon, patterned somewhat after a plant at Ashtabula, but embodying a number of important improvements. By courtesy of Mr. J. H. Maddy, press agent of the road, and Mr. B. A. Galleher, agent of the road at Sandusky, we are enabled to illustrate herewith some of the details of this plant and briefly describe its operation.

Fig. 1 shows the location of the dock, on Sandusky Bay, and some of the surroundings. The four coal pockets are built into a trestle 23 feet high to base of rail. The incline leading to the pocket has a grade of 3 per cent and the rack over the pocket has a grade of 10 inches per 100 feet, sloping toward the incline, so that the empty cars may be handled by gravity. The trestle affords room for handling eight coal cars at one time. A good idea of the construction of the pockets may be obtained from the sectional view, Fig. 2. Each pocket has a capacity of 38 tons, to the bottom of the beam, and either side-dump or drop-bottom cars may be unloaded. For unloading side-dump cars the platform or running board.

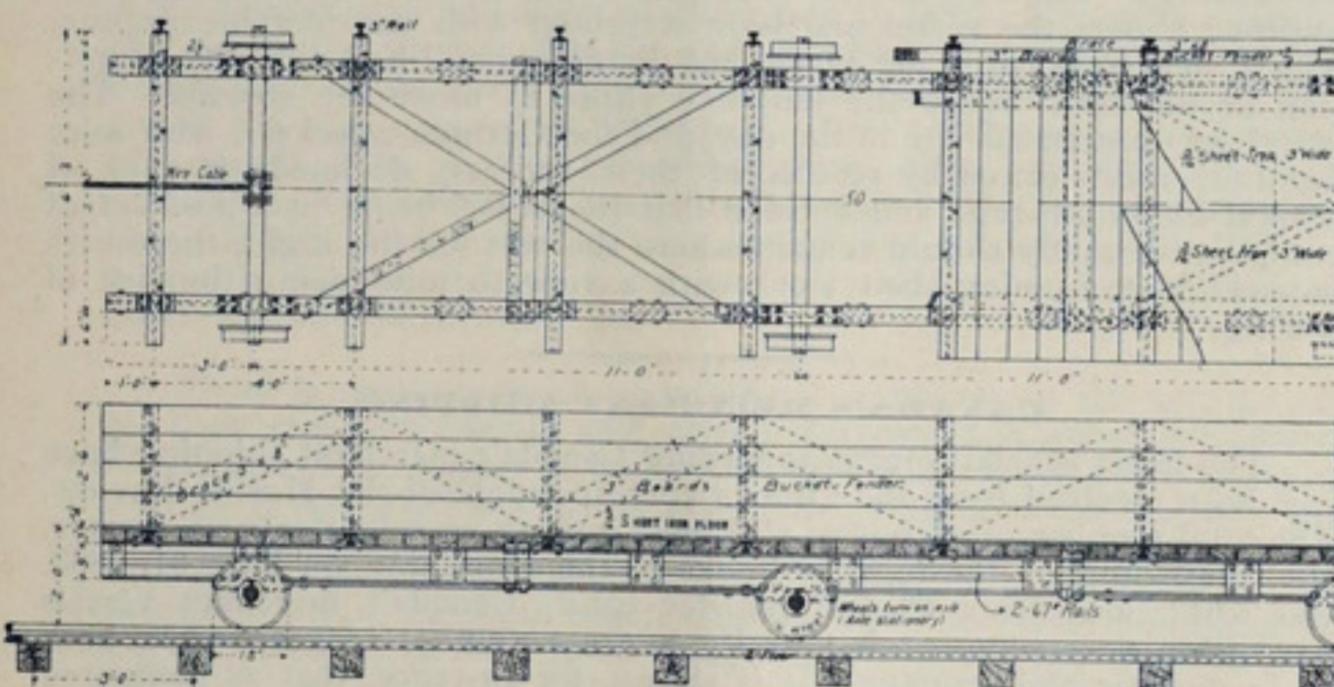


FIG. 8—SIDE ELEVATION AND PLAN OF BUCKET TRUCK

on either side the pocket, at the top, is made to fold over, out of the way of the falling coal. The coal escapes from the pocket through an opening 3 feet high marked "door" in the figure, and slides against a gate faced with a  $\frac{3}{8}$ -inch iron plate. This gate is 3 feet 4 inches high and 3 feet  $1\frac{1}{2}$  inches wide and is lifted by a steam cylinder 7 inches in diameter, with a 3-foot stroke. Other details of construction about the pocket are sufficiently well shown in the drawings.

From the gate the coal drops into sheet iron buckets of  $4\frac{1}{2}$  tons capacity, carried upon a truck running upon a depressed track of 5 feet 6 inches gage, 2 feet 8 inches below the top of dock. There are two of these trucks, each 50 feet long and each carrying eight buckets. The track for the bucket trucks is shown in Fig. 1, and the details of the bucket and truck may be seen in Figs. 2 and 3. The bucket trucks are moved back and forth by machinery located at the end of the track, double cables being attached to the truck, so that it may be pulled in either direction, as desired. The man operating the hauling engine receives his signals by electric bell from the man operating the steam cut-off or switch.

In the operation of loading a vessel, the vessel ties up alongside the

dock and the buckets are filled and run to position opposite the point where the coal is taken into the vessel. On a track of 16-foot gage, between the bucket track and the vessel, there are two traveling steam cranes, which hoist the buckets from the trucks and swing them into position over the vessel. The buckets have automatic drop and self-closing bottoms, and the speed of handling coal is very rapid, the average rate being 400 tons transferred from cars to vessels per hour.

This plant was put into operation April 11, 1898, and during the season of that year handled very nearly a half million tons of bituminous coal. The plant has given very good satisfaction, and it is said that the steamboat men prefer it to most other plants on the great lakes. After a boat ties up at the dock it does not have to move until loaded. It is claimed for this method of unloading that the coal is not broken up as

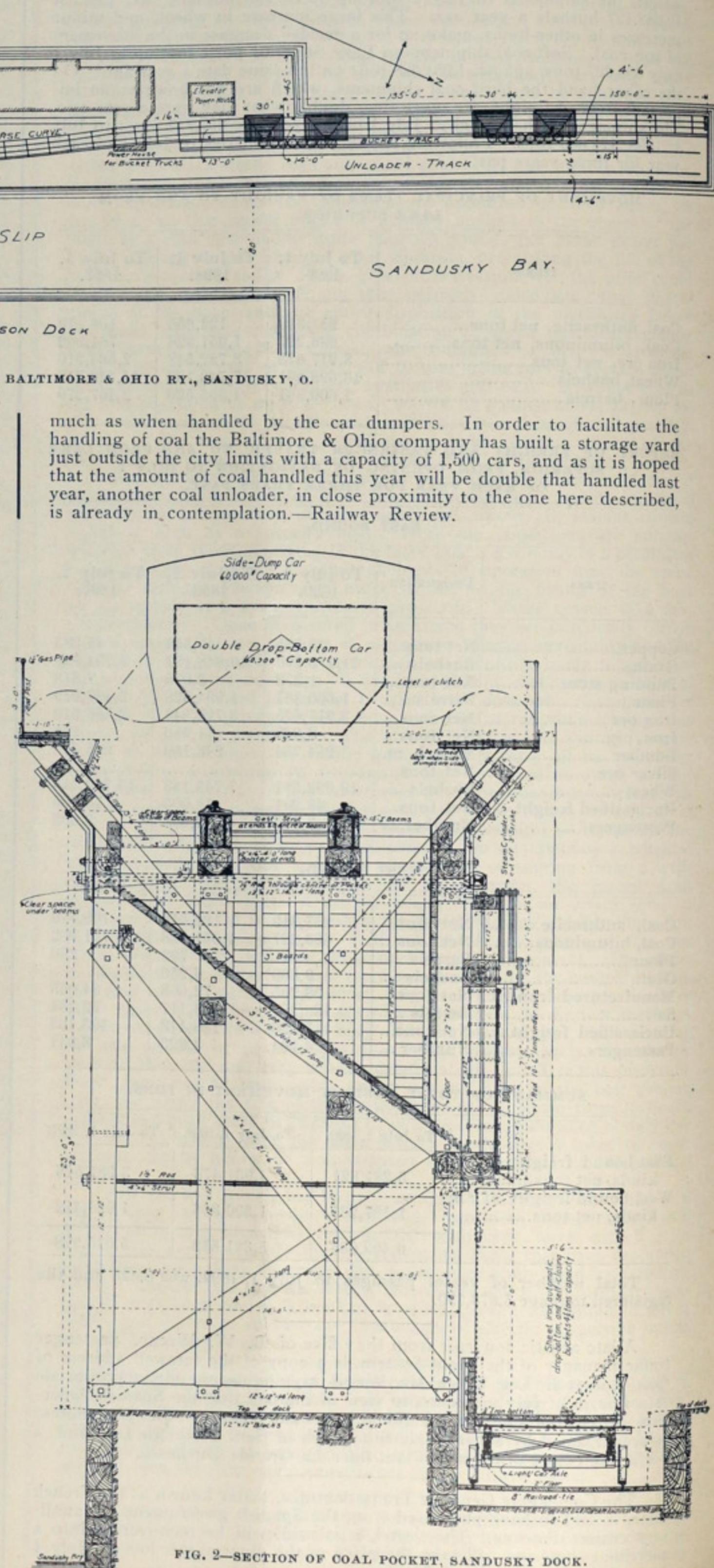
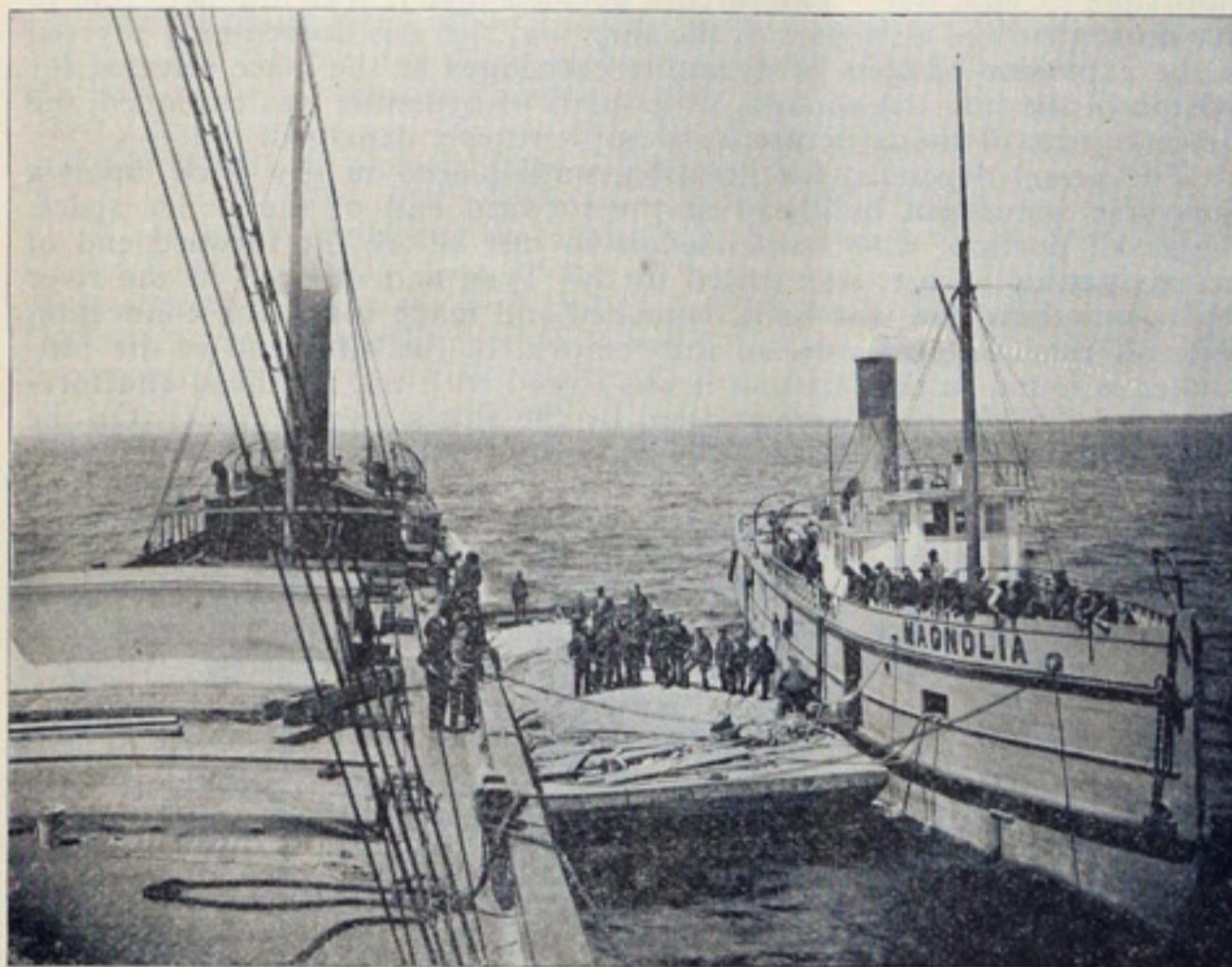


FIG. 2—SECTION OF COAL POCKET, SANDUSKY DOCK.

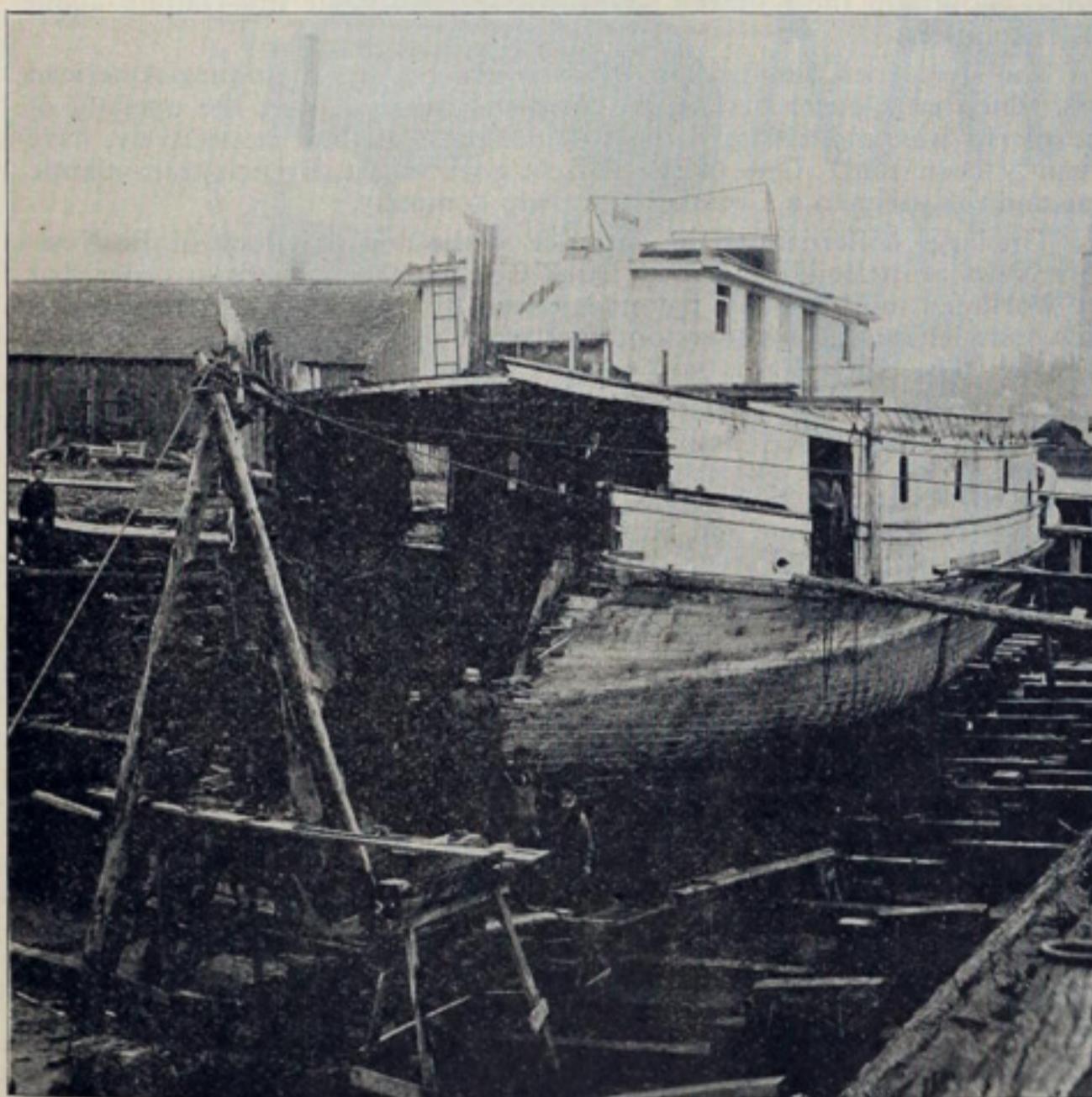
## WRECKING FACILITIES ON GEORGIAN BAY.

It sometimes happens that the best wrecking outfits are found where they are least expected. On June 17 last, the steamer City of Glasgow, a large wooden vessel owned by Hutchinson & Co. of Cleveland, and laden with a cargo of grain from Chicago, stranded in Georgian bay, near Midland, Ont. Within the past few years the grain movement to Georgian bay ports, both from Duluth and Chicago, has shown a very large increase, but it must be admitted that owners of vessels on this side have entertained some fears of this trade on account of the shallow waters of the bay and a lack of knowledge on their part regarding available assistance in case of accident. This fear has, however, been set aside by the



LIGHTERING GRAIN FROM THE CITY OF GLASGOW.

experience of the City of Glasgow. She was really badly stranded near Midland, Ont., but with the assistance of Playfair's Barge & Tug Line of that place, James Playfair manager, some 33,000 bushels of her grain was hurriedly lightered and she was released within four days. It would seem that James Playfair is himself a very large part of the town of Midland and his diversified interests in raft towing, in the manufacture of lumber and in other lines enable him to offer unusually efficient service in cases of accident like that which befell the City of Glasgow. The illustration printed herewith shows a lighter, the tug Magnolia and a force of



WRECK OF STEAMER J. H. JONES, RAISED BY JAMES PLAYFAIR.

men at work on the Glasgow, relieving her of part of her cargo so as to float her without great injury. It will be seen at a glance that the tug is suited to almost any kind of heavy work, but she is only one of three of similar type that are owned by the Playfair interest. The other two are named Minataga and Metamora. Referring to the release of the Glasgow, Mr. Walton McGean of Hutchinson & Co. says:

"I was certainly surprised to find up there in the woods such an outfit as that owned by Mr. Playfair. There are no better tugs to be found on the whole chain of lakes, and he has them at his command always for

wrecking purposes, as he can readily call them off any time from their log towing work. There is also a fine outfit of pumps, jacks and hawsers, and two good drivers ready at call. The lighters are only fair, but equipment in this regard is to be improved at once. It would, of course, be impossible to keep up such an outfit or such an organization but for the fact that Mr. Playfair is engaged in lumbering and in saw-mill pursuits. But best of all is the reasonable charge for labor, which did not exceed 25 or 30 cents an hour per man on our work, and there was no loafing. They were all kept at work while the job lasted."

Another picture presented herewith shows the small wooden steamer J. H. Jones in dry dock at Owen sound. This vessel, after a collision with the Pacific, was raised in November, 1898, from 55 feet of water by a Playfair expedition.

## COMBINATION GAS AND BELL BUOY.

Mr. Wm. St. John, general agent of the Safety Car Heating & Lighting Co. of New York, representing the Pintsch system of light and steam heat in this country, is making a tour of the great lakes. This company, controlling patents on the gas buoys that have become so popular for the lighting of harbors, rivers and channels throughout the United States, is now introducing a bell attachment for the gas buoy that must eventually take the place of all other forms of sound in aids to navigation of this kind. Mr. St. John is on the lakes for the special purpose of consulting the several district officers of the United States light-house board and determining where this form of buoy, giving forth both light and sound, can be used to best advantage. Experiments with the bell attachment, which is of the usual 200 pound kind, have been under way for nine months past at Robbins' reef, opposite Staten island, New York, and there is no question as regards its practicability. Its great advantage is continual operation under all conditions of weather, and the fact also that the gas used in its operation is consumed at the burner of the buoy. The mechanism is so arranged that two blows are struck in 50 seconds—a long interval of 45 seconds and a short one of 5 seconds. The New York company has just sold twelve gas buoys to the United States light-house board—six for Norfolk, Va., and the other six probably for Tampa, Fla. Twenty-five more buoys are building at the Continental Iron Works, Brooklyn, N. Y.

A summary recently made up by the Safety Car Heating & Lighting Co. shows that there are 678 buoys, 197 beacons, and 23 light-ships operated under the Pintsch gas system in the various maritime countries, and that some forty works are employed in the manufacture of gas for these aids to navigation. The number of passenger cars on railways throughout the world using the Pintsch system of lighting is 90,890 and the number of locomotives is 3,654; these are supplied from 303 gas works.

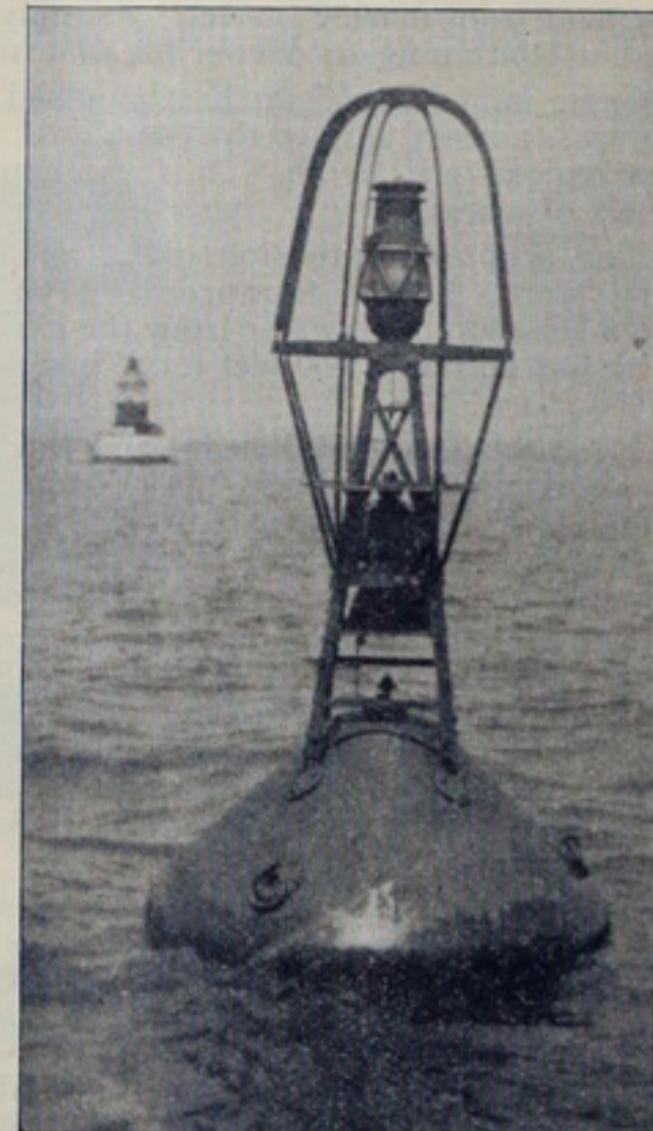
## WILLIAMSON BROS'. NEW WORKS.

Williamson Bros., manufacturers of steering engines, Philadelphia, are erecting an entire new plant, consisting of a main building 80 by 224 feet, a power house of 42 by 35 feet and a boiler shop of 35 by 120 feet on the corner of Cumberland and Aramingo avenues two squares from their present plant. Offices of the firm will be located in the end of the main building, taking up both floors. The main shop will be built of steel from Schiffler Bros., Pittsburg, with brick walls, and will be well lighted by sky-lights and large side windows. It will contain two galleries, each 25 feet wide, and a 30-foot centerway. Under each gallery will be located a 4-ton traveling crane. A 15-ton crane will be installed in the centerway. Steam heat, electric light and all modern conveniences will be provided throughout the works.

The line shafting will be driven by electricity, furnished by a generating set composed of two Electro-Dynamic Co. dynamos, direct connected, with engines built by the Harrisburg Foundry & Machine Co. The two 54-inch boilers to be used are being built by Williamson Bros. In addition to these buildings, commodious sheds for the storing of patterns will be erected. The plant will be ready for occupancy about Nov. 1.

Vessels built abroad and registered in Japan after Oct. 1 next will be entitled to only half bounty. For the Japan-European, Japan-Seattle and Japan-San Francisco lines annual subsidies of \$1,336,945, \$327,015 and \$506,940 respectively have been granted for ten years beginning with Jan. 1, 1900. The development of the Japanese merchant marine is indicated by statistics relative to the passage of Japanese vessels through the Suez canal. In 1896 there were ten vessels of 42,695 gross tons; in 1897 thirty-six vessels aggregating 165,425 tons, and in 1898 forty-six vessels of 261,602 tons.

The submarine boat Argonaut, the invention of Simon Lake of Baltimore, and the rebuilding of which was described at some length in the Review last week, was launched a few days ago at Robbin's ship yard at the Erie basin, Brooklyn, N. Y. It is expected that she will be ready to go into commission inside of two weeks.



GAS BUOY WITH BELL ATTACHMENT.

## AROUND THE GREAT LAKES.

Capt. Wallace King died at his home at Toledo a few days since.

Breyman Bros. of Toledo, have the contract for lengthening to 500 feet the dry dock at the yard of the Craig Ship Building Co.

Capt. Henry Campbell, one of the best known masters on the great lakes, died a few days ago at his home at Two Rivers, Wis.

Capt. Chester A. Harding, United States engineer at Grand Rapids, Mich., will open bids Aug. 28 for the construction of a hydraulic dredge.

Life savers on Plum island, "Dear's Door," Lake Michigan, have not been idle thus far this season. They have responded to twenty-six calls.

Major T. W. Symons, United States engineer at Buffalo, advertises elsewhere in this issue for proposals for breakwater work at Buffalo. The bids will be opened July 26.

The schooner H. C. Winslow, which has been tied up by the United States marshal on supply bills, will be sold under the hammer next Tuesday at her dock at Twenty-third street, Chicago.

The steamer White Star, which was sunk at St. Clair flats by the Vanderbilt, has completed repairs at Abram Smith & Sons ship yard, Algonac. The schooner Lillie May is also receiving a rebuild at the same yard.

Capt. J. S. Dunham of Chicago has decided that he will modify his retirement from marine service by simply withdrawing from the tug business but continuing to devote his time to several vessels which he owns.

Capt. James Davidson has launched at West Bay City the schooner Matanzas, a sister ship to the Santiago. She is 335 feet in length, 45 feet beam and 26 feet depth. It is estimated that she will carry 175,000 bushels of wheat.

The proposed extension of the breakwater on the eastern side of Grand Marais harbor entrance has been abandoned. The plan now is to build a separate breakwater from the extreme point on the western side of the harbor entrance, 350 feet long, in a southeast direction, to be finished in 1900.

Mr. John Craig of Toledo, and three members of the firm of Miller, Bull & Knowlton of New York, owners of the steel steamer Mae, just completed at the Craig yard for coast service, are aboard the vessel on her trip down the Welland canal and St. Lawrence river. On a draught of a trifle less than 14 feet the Mae loaded 58,000 bushels of corn.

The United States light-house board has given notice of the placing of three gas buoys in lakes Ontario and Erie. One is on the westerly side of Galloo island shoal, Lake Ontario; the second is on the south shoal at Kelly's Island, and the third is in place of the spar buoy at the elbow of the rocky shoal extending northeasterly from Peach Orchard point, westerly side of the entrance to Put-in-Bay. All three buoys show a fixed white light.

Maj. Clinton B. Sears, United States engineer at Duluth opened bids, a few days ago, for the breakwater extension at Presque Isle point, Marquette. Powell & Mitchell of Marquette, are the lowest bidders, their figure being \$27,000. Fitzgerald & Norris of Duluth, submitted a bid of \$68, but evidently this means per linear foot, which would make the aggregate \$34,000. Other bidders are Alexander Sang, Duluth, \$36,700; the Butler-Ryan Co., St. Paul, Minn., \$29,300.

Joseph Grant, representing the Empire Wreckage & Salvage Co. of Colorado Springs, Col., is in Cleveland at 11 South Water street, and has with him a large supply of canvas bags, air machinery, etc., with which he is anxious to make a trial at raising a few of the numerous wrecks that are sunk throughout the lakes. He has just raised a vessel near New York harbor, the schooner Glenola, owned by L. Boyers' Sons, and says he proposes to remain on the lakes long enough to undertake a job of some kind with the air bags. He insists that he can raise any vessel from reasonable depth of water, and his plan of working all the time is to deliver the vessel in port or get no pay.

It is quite probable that unusual delays in securing material will prevent the completion this fall of one of the two large steel freight steamers building at the Wyandotte yard of the Detroit Ship Building Co. The other boat, known until a few days ago as the Eddy steamer, will be finished late this fall. Slow delivery of material will also delay the hull of the large river excursion steamer that is to be built for next season by the Detroit company, but work on engines and boilers is going ahead just the same. Mr. C. B. Calder, who is Mr. Alex McVittie's principal assistant, has assumed the direction of affairs in the Wyandotte yard, as well as in other departments of the Detroit works.

A contract for electric light fixtures for the four Morgan line vessels now under construction at Newport News, Va., has been awarded to the Wm. Porter's Sons Co., 271 Pearl street, New York City. This firm is also furnishing electric and oil apparatus for five or six yachts building in Atlantic coast yards.

Low Rates to Pacific coast points.—The Nickel Plate road sells excursion tickets at special low rates to San Francisco and all Pacific coast points. Through palace sleepers and superb dining car service via the Nickel Plate road. Ask agents.

78, July 24.

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## SAVED HALF THE SHIP.

Short reference was made in the Review, not long ago, to a novel feat in wrecking operations on the steamer Milwaukee, reported from England. The story of how a large part of this vessel was removed from a rocky shore and towed into dock to be joined to a new bow, was briefly told. Now that the rebuilt ship has left the Tyne and is again in commission, the full particulars of the work are available.

The Milwaukee was built by C. S. Swan & Hunter at Wallsend-on-Tyne, England, in 1897, and is 470 feet in length, 56 feet beam and 32 feet depth. Her injuries were sustained by stranding upon the rocks at Port Errol, near Peterhead. She was locked in place by a huge rock, 30 feet in length and 8 feet in height, which held her in such a manner that it was impossible to float her. The salvors decided that it was impracticable to save more than the after part of the ship, and she was accordingly severed by the explosion of belts of dynamite cartridges at the place selected for division of the hull. Although 520 pounds of dynamite was exploded, the adjacent parts of the structure were not seriously damaged.

The vessel depended for flotation, until placed in dry dock, upon a transverse watertight bulkhead at the forward end of the boiler space. The saved portion, which extended from just before the forward end of the navigating bridge, was towed to the Tyne and moored in the river until a new bow end was built, launched and made ready for connection to it. A remarkable feature of the removal of the after end of the Milwaukee is found in the fact that it was towed with the bulkhead end foremost, and that the tugs were assisted by the ship's own engines. On the arrival of the half of the boat at the Tyne, her builders set about the work of reproducing a fac simile of the lost bow, and so successful were they that a person not conversant with the facts would never guess but what he was looking at the original bow and would find it impossible to point out where the junction was effected. It is also notable that so successful was the attempt to dry dock the two sections of the ship in correct relative positions, that little subsequent adjustment was necessary.

## ITEMS OF INTEREST.

Thorpe, Platt and Co. of 97 Cedar street, New York, have been appointed American agents for the assistant cylinders for valve gears manufactured by Messrs. David Joy, Son & Pryor.

Senator Carter of Montana is the latest member of congress to declare that the Republican party will undoubtedly favor the upbuilding of a merchant marine. He says the growth of the navy will necessarily follow.

The latest record for time between Havana and New York City has been made by the Ward liner Mexico, recently completed at the Cramp yards, Philadelphia. Her time for the passage was 2 days, 15 hours and 40 minutes.

Ship builders all over the country are in dire straits by reason of the difficulty encountered in securing material. At the yard of the Neafie & Levy Co., Philadelphia, for instance, seven keels are to be laid but there is not on hand a single plate of iron with which to make a start.

A preliminary machinery trial of the torpedo boat Dahlgren, built by the Bath Iron Works, Bath, Me., was highly satisfactory. At one time during the trial the boat made a speed of 17 knots with only 175 revolutions. To attain the required speed of 30½ knots she must attain about 325 revolutions.

The steamers Columbia and Normannia of the Hamburg-American line, which were purchased by the Spanish government at the opening of the recent war and renamed the Rapido and Patriota, respectively, have recently been sold. One of the vessels goes to the French transatlantic line and the other to a German steamship company.

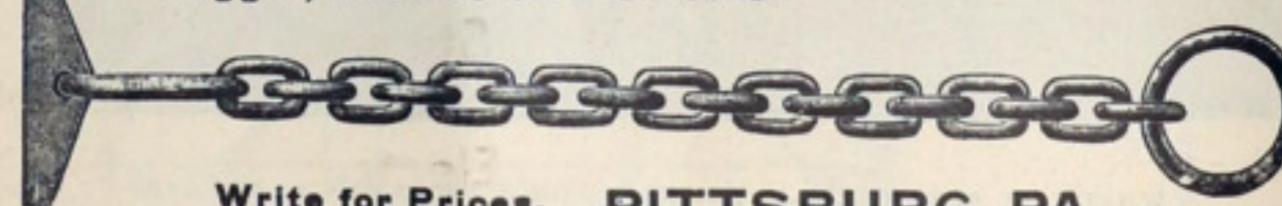
The large cofferdam at the entrance to the new dry dock of the Newport News Ship Building & Dry Dock Co., which was built in order that the workmen might not be inconvenienced by interference from water, is now complete and it is understood that work on the basin itself will begin at once. The cofferdam is said to have cost about \$40,000.

Officers of the battleship Iowa are congratulating themselves that the discovery was made before the vessel left the dry dock at Port Orchard, Wash., that serious injuries to her furnaces had been sustained during the long run from New York to San Francisco. Two furnaces were nearly burned out and another attempt to fire them would have caused a breakdown. Fifteen days will be required for repairs.

Secretary Long of the navy department has called for bids for the construction of a timber dry dock at League Island navy yard, Philadelphia. The department is also about ready to call for proposals for the construction of the masonry dock planned for the Portsmouth yard. These two new docks, together with the Boston dock, will give the navy docking facilities on the Atlantic coast that have long been needed.

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Manufacturers of all kinds of  
High Grade Boom, Rafting,  
Toggle, Marine and Swedish IRON CHAINS.



Write for Prices. PITTSBURG PA.

## FOR SALE.

Tug M. SHIELDS—Engine measures 18 x 20 inches. A great bargain. Address LEWIS HOHMANN,

July 18.

216 Sunnyside Avenue, Chicago, Ill.

Boiler manufacturers on the Pacific coast are evidently not very badly in need of work. Commander U. Sebree, inspector of the twelfth light-house district, with headquarters at San Francisco, opened proposals on the 7th inst. for new boilers for the light-house tender Madrons. Following are the bids with time required for the work: Union Iron Works of San Francisco, \$14,500, three months from receipt of material at yard in San Francisco; William J. Brady of San Francisco, \$16,750, May 1, 1900; Moran Bros. Co. of Seattle, \$17,049, 120 days; T. J. Moynihan of San Francisco, \$17,990, nine months; Patrick F. Dundon of San Francisco, \$19,337, seven months; Risdon Iron & Locomotive Works of San Francisco, \$20,980, six months; Fulton Engineering & Ship Building Works of San Francisco, \$21,190, 150 working days; Wolff & Zwicker Iron Works of Portland, Oregon, \$16,966, 180 days.

The Newport News Ship Building & Dry Dock Co., Newport News, Va., has laid the keel for the Proteus, the second of the Cromwell line and the last of the six vessels ordered at the close of the Spanish-American war by the Morgan and Cromwell lines. Turrets for the battleship Kentucky have just been placed in position.

A record for rapid engine building has been made by S. F. Hodge & Co. of Detroit, Mich. In the interval between May 1 and June 17 they made special patterns for and built a 1,200-horse-power cross-compound Corliss engine, with cylinders of 24 and 50 inches diameter and 42 inches stroke, for use in a grain elevator at Duluth, Minn.

Manager D. E. Ford of the Superior Ship Building Co., is enthusiastic over a valve gear that was built at the West Superior works some time ago and placed on the engine of the ship building company's tug Islay. The gear is the invention of Lincoln A. Lang of Yule, North Dakota. Mr. Ford says of it: "The gear we placed on the Islay has been running without repair or re-adjustment since we started it last July. On the fuel trial, which we gave this gear against the Stevenson link gear, the engine was worked up close to maximum power, and the saving in fuel through using the new gear was clearly 20 per cent., with conditions alike on both trials. With the new gear the saving in fuel is much greater than this, with the engine working at lower powers. The engine works with a more even turning motion, with less vibration, and is much easier kept up than formerly."

L. S. Thorn, third vice-president of the Texas Pacific railroad, is quoted as saying that the interests of the Goulds on the Gulf of Mexico are assuming such proportions as to make imperative a number of contemplated improvements, not the least important of which is the establishment of a steamship line from the Atlantic seaboard to the Gulf.

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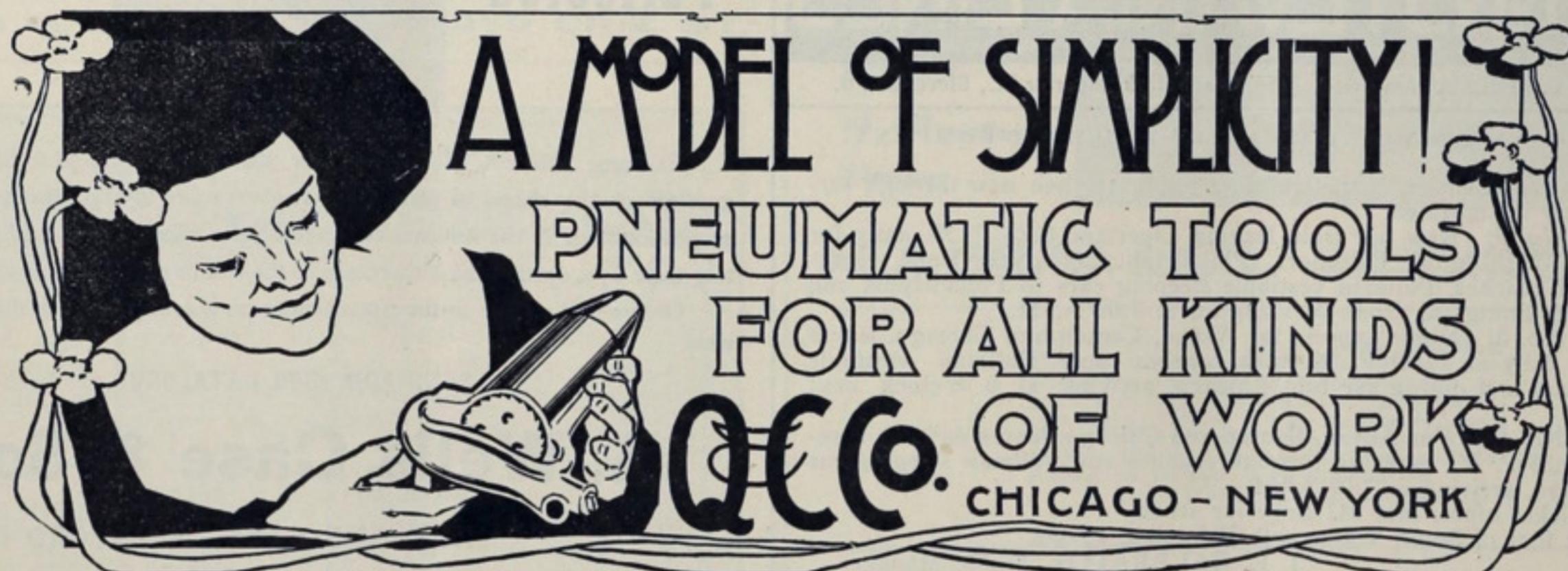
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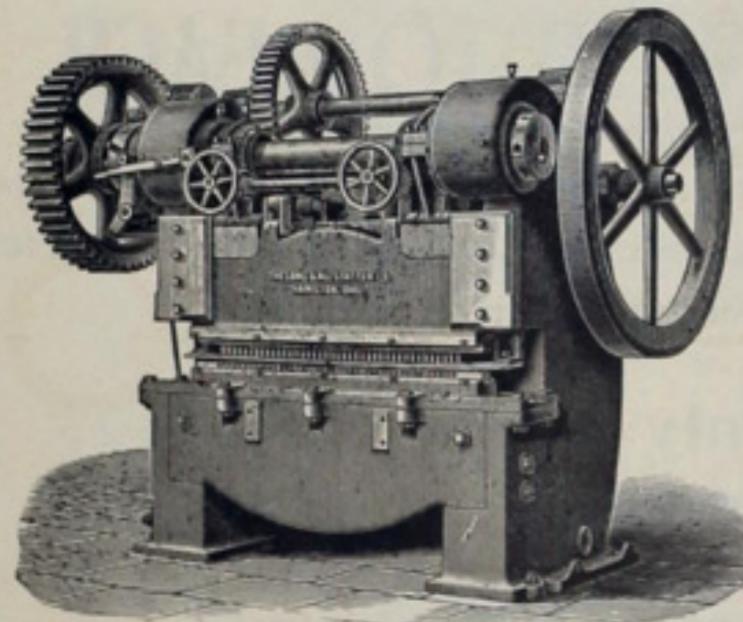
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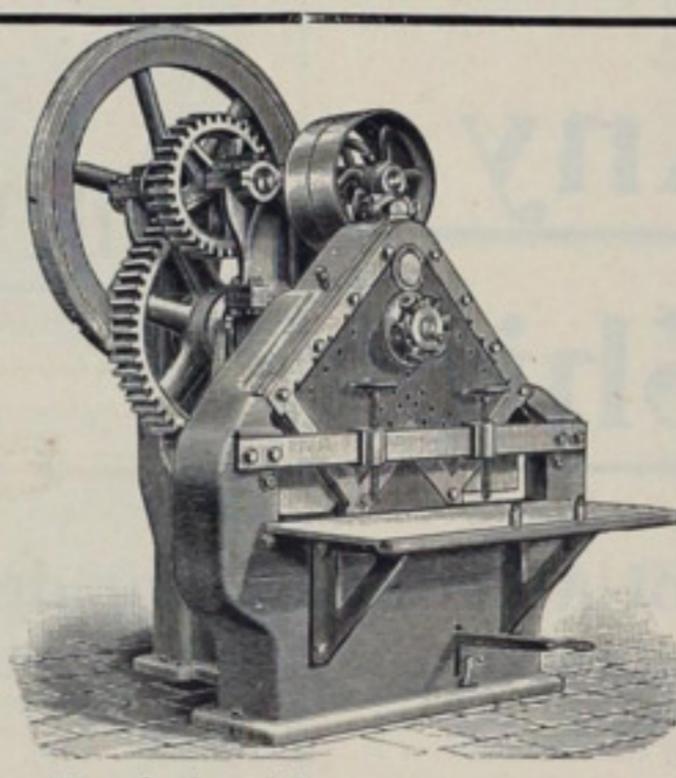
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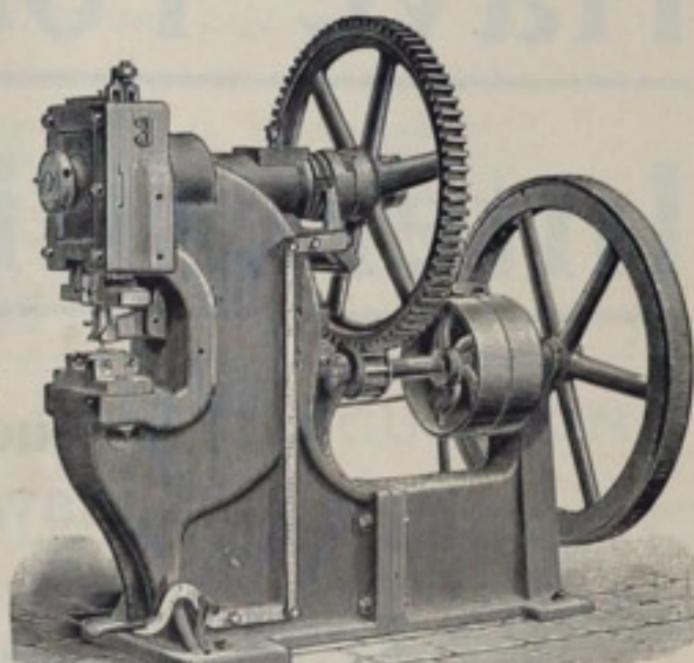


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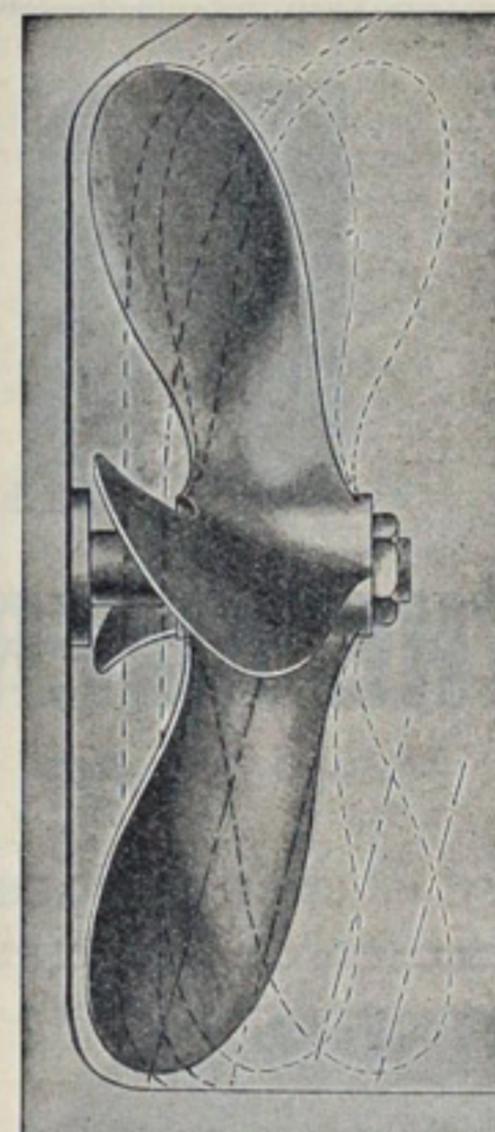
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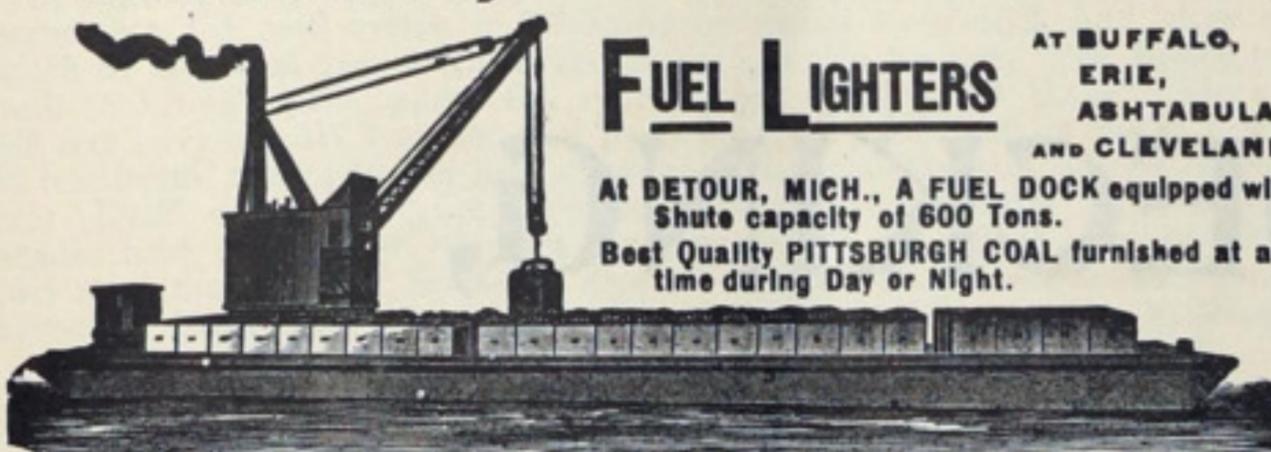
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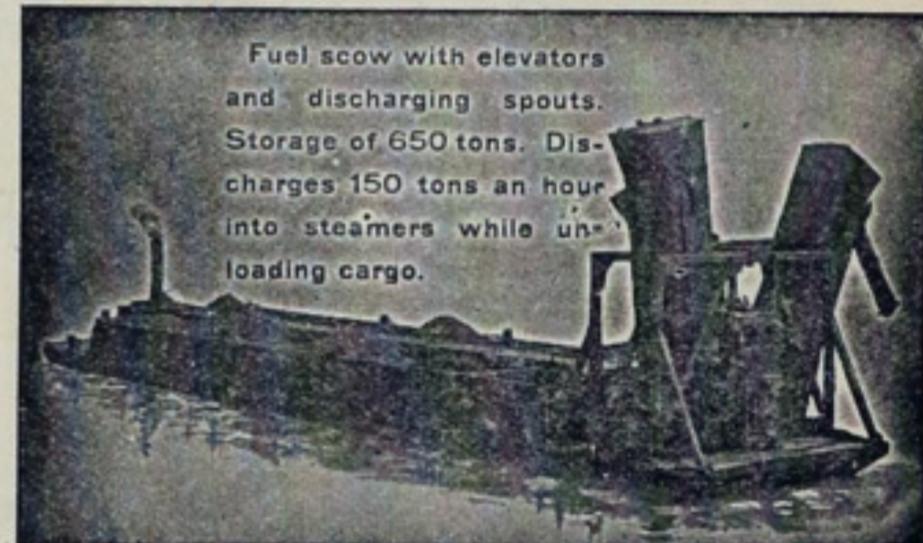
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U. S. Engineer Office, Jones Building, Detroit, Mich., June 30, 1899. Sealed proposals for dredging at Cheboygan and Alpena harbors, and Saginaw, Sebewaing, and Belle Rivers, Mich., will be received here until 12 o'clock, noon (standard time) July 24, 1899, and then publicly opened. Information furnished on application.  
G. J. LYDECKER, Lt. Col., Engrs.  
July 20

U. S. Engineer Office, 57 Park St., Grand Rapids, Mich., July 5, 1899. Sealed proposals for repairing government pier at White Lake, Mich., will be received here until 3 p. m., July 20, 1899, and then publicly opened. Information furnished on application.  
CHESTER HARDING, Capt., Engrs.  
July 13

U. S. Engineer Office, D. S. Morgan Building, Buffalo, N. Y., July 11, 1899. Sealed proposals for construction of timber crib and concrete breakwater at Buffalo, N. Y., will be received here until 11 o'clock A. M. July 26, 1899, and then opened. Information furnished on application. T. W. Symons, Major, Engrs.  
July 20

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